Factors affecting the uptake of Natural language processing within the New Zealand Law System

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Statement of original authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signature: ___Alex Thomas_____

Date: 20/06/2021

Acknowledgments

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Nobody has been more important to me throughout my studies than the members of my family.

Abstract

Many legal appeals and applications happen on a year to year basis and are continuing to grow. This research focuses on New Zealand as the researcher is in New Zealand and participants involved in the research are in New Zealand. The issues include the involvement of NLP in Law, integrating technology into Law, Examples of integrating technology into Law, privacy concerns, what is NLP and machine learning.

The research aims to discover the challenges of integrating technology and Law based on the opinions of lawyers, discover the challenges for cases taking longer to process and shorten the workload through NLP and discover the current state of where NLP is. Contribute to providing an example of adding technology into New Zealand Law, contribute to providing the challenges of adding technology into New Zealand Law.

The researcher adopts a quantitative research method for this thesis. The research model for this research is a modified TAM model. Data was collected via an online survey tool called Qualtrics. The survey has 27 survey questions: a mix of Nominal, Interval, and No Measurement as they are open-ended questions. What was found is legal professionals will gladly try any technology and provide their options on this technology. The most desired features are Templates and automation.

Results found is legal professionals would gladly provide their options on this technology. There is a feeling of more information needed from participants to find the gap as to why some don’t think it could be used. This lack of information also seems to show due to participants expressing their thoughts through a survey, and they do not need to explain themselves more clearly compared to face to face interviews. The Chi-Square showed that there is a relationship between the type of practice and their experience getting day-to-day tasks done and type of practice and level of degree; however, this changes when it comes to day to day tasks done and type of practice comes to post-test as there are fewer participants. There appears to be a relation between age and years of retention/practice and age and their experience learning the technology. ANOVA showed that age is significant when it is concerning years of retention/practice.

Keywords: AI, NLP, Natural Language Processing, Law, Legal, New Zealand, Technology

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1.0 Introduction

Legal Cases continue to grow from 2017. This large number of appeals and applications is an eight percent increase in total workload than 2016. This research is focusing on New Zealand as the researcher is in New Zealand. The issues include the involvement of Natural Language Processing(NLP) in Law and privacy concerns.

1.1 Background

The research started while researching that in 2017 in the appeal court, 657 appeals and 231 applications were filed (Brett, 2017). Seeing this large number of appeals and applications and seeing technologies like OpenLaw (*OpenLaw NZ*, 2020) using technology to make finding research material more accessible got the researcher wondering if it is possible to make the workload more manageable. This researcher has investigated the current state of Natural Language Processing, the components in NLP, a comparison of NLP models, what NLP is being used for (at the time of writing) in Law and outside of a Law environment. The issues include the involvement of NLP in Law and privacy concerns. This research is focusing on New Zealand as the researcher is in New Zealand. There is an always increase of need for lawyers in New Zealand, from 2010 having 11,223 and now in 2020 is 14,981 meaning that if everyone needed legal help each lawyer would manage 356 people (Adlam, 2020).

1.2 Research Aim

The research aim is what this research contributes, which is discovering the issues that are causing the increased workload and increase in needed lawyers found in the background. The research aim is also the purpose of the research, mainly integrating NLP technology into Law.

- The discovery that there appears to be a lack of New Zealand papers that integrate technology and Law
- NLP may shorten the long process time for cases if NLP technology is used to assist lawyers
- To discover the requirements of developing technology for the law practice based on the opinions of lawyers

- NLP may assist lawyers in coping with an increasing caseload by automating tasks and sending recommendations to lawyers about their reports and cases
- Discovery of the current state of where NLP is
- Contribute to providing an example of adding technology into New Zealand Law
- Contribute to providing the challenges of adding technology into New Zealand Law.

1.3 Document structure

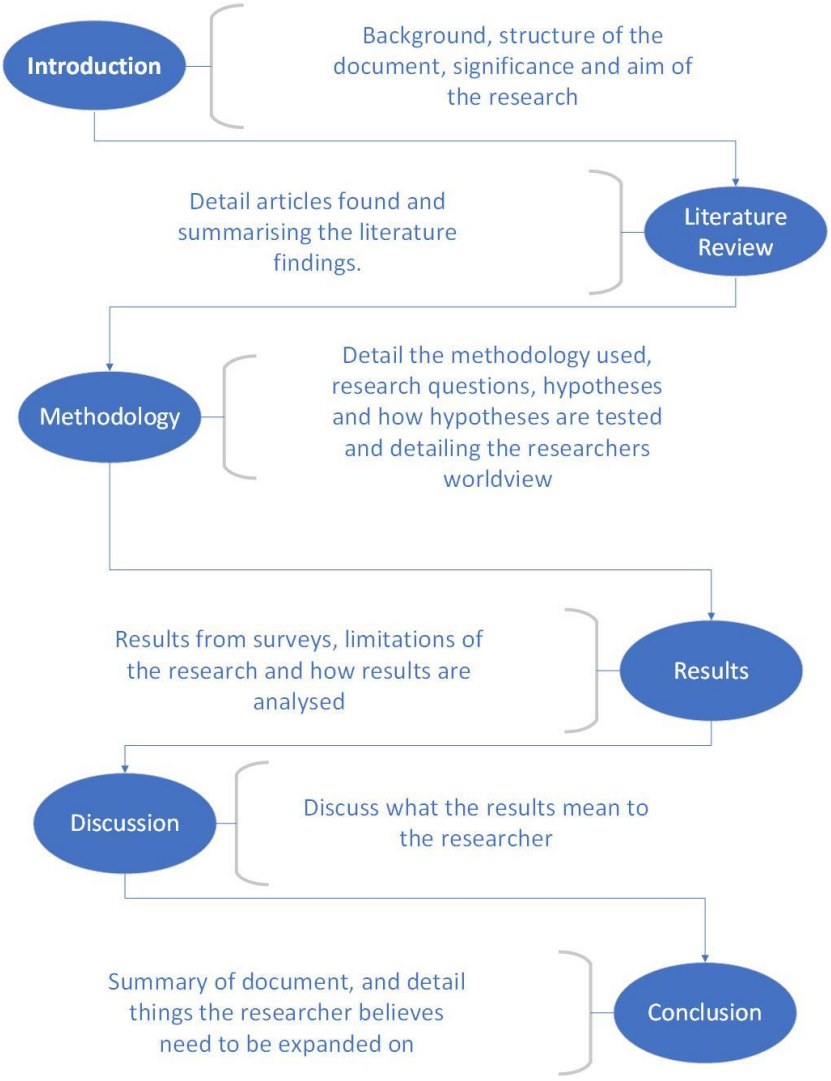

Figure 1 Document Structure

The research document is about what NLP is and how NLP is currently used, what AI has to do with NLP, why and how the pre-test – experiment – post-test research method has been used for this research.

Chapter 1 introduces the background and aim of this research.

Chapter 2 discusses the findings in the existing literature. The PRISMA literature review has been performed for 60 previous articles in a related area. The literature review forms the basis for the research. The finding through the literature review resulted in establishing the research motivation.

Chapter 3 discusses the methodology and the research design. The methodology and method sections are about the researcher's hypotheses on the research, the use of pre-test and post-test and what the researcher believes is justification for the survey questions, how the researcher will sample people, and how the researcher will gather information from people. A mapping among the researcher questions, the hypothesis and the hypothesis-testing methods are also presented and discussed.

Chapter 4 is the results of survey data analyses. Descriptive analysis, Chi-Square analysis, and two-way ANOVA test have been performed to test the relationship between variables.

Chapter 5 is the discussion of findings from chapter 4.

Lastly, the researcher presented the conclusion of this research in Chapter 6, and the limitations section is about what the researcher believes is lacking in the research and other research limitations. The research timeline details how the researcher believes tasks are done and how the researcher has built the application and gathered information.

1.4 Conclusion

From the background, we found an increase of cases for lawyers and an example of technology being used to assist lawyers meaning the technology could be used to assist lawyers. From the document structure, this document will go into findings found in the literature summarised and grouped into themes, followed by how the research is designed, then the results of the research, after a discussion of the results from the survey. From the research aim, the purpose is to discover the requirements of developing technology for the

law practice due to the lack of New Zealand papers that integrate technology and Law. The next chapter presents the PRISMA literature review and the findings from the literature gathered.

2.0 Literature Review

In this chapter, the researcher will discuss the findings from relevant literature. This research uses the PRISMA guideline (PRISMA, 2020) and uses a literature map to link the references into themes.

2.1 PRISMA Literature Review

PRISMA stands for Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA, 2020). The PRISMA aims to help authors improve the reporting of systematic reviews and meta-analyses (PRISMA, 2020). PRISMA helps through the use of providing tools like a checklist and a four-phase flow diagram. The checklist details the things the researcher should add to their report. The flow chart available on PRISMA is a non-filled out

Table 1 Inclusion / Exclusion criteria

. The flow chart is made for the researcher to detail the records/articles they have found and the number of records they included and excluded.

2.1.1 Criteria

Below is a table of how articles were searched through databases. An example of this is the inclusion column, the need for the literature to available to the researcher, the paper needs to be relatively recent to the year published, the text needs to be in English, and the papers need to be focused around “Machine Learning, Law and Natural Language Processing”.

Inclusion Criteria	**Exclusion Criteria**
Full Text	Non-English
Published within the period 2016-2021	Not accessible
In English	Outside of the publishing period 2016-2021
Machine Learning	
Law	
Natural Language Processing	

Table 1 Inclusion / Exclusion criteria

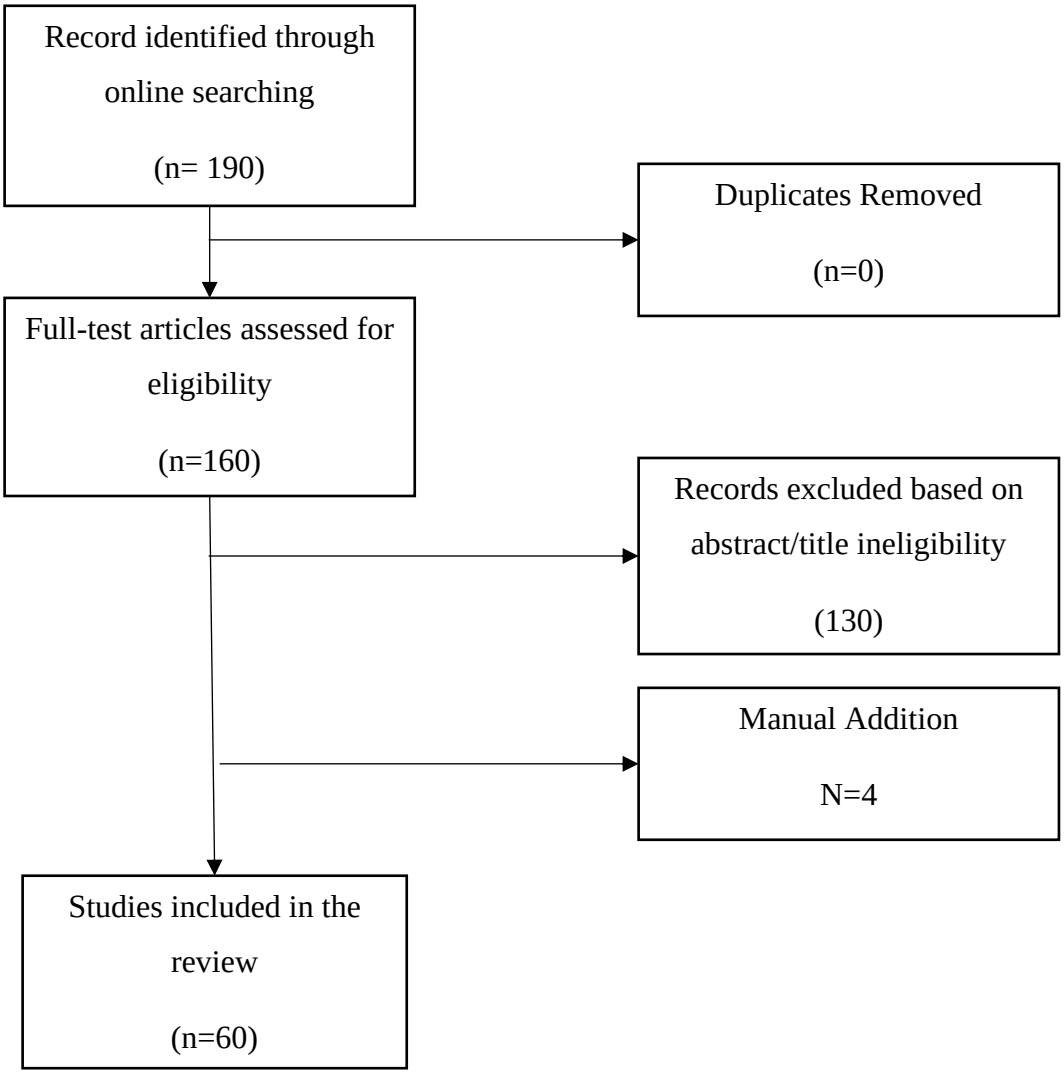

Figure 2 PRISMA flow chart

A systematic reviewed of 60 articles published between 2016-2021 was performed. An online search was performed through EBSCOhost, IEEE Xplore, ScienceDirect, and arXiv on 01 February 2021. The search included relevant keywords detailed in the inclusion criteria (Table 1 Inclusion / Exclusion criteria). An appropriate Boolean logical operator such as “OR”, “AND” to ensure a sensitive search strategy. An example of these searches can be

'Natural Language Processing' AND 'Law' when wanting to find examples of NLP used in relation to Law. The search strategy returned 190 articles. The researcher did a preliminary screening of those articles using a summary and abstract check, excluding 124 and 0 duplicates. Based on the inclusion and exclusion criteria, sixty-four articles remained. Furthermore, the researcher added four papers consistent with this research question and inclusion criteria, as they are related to the relevant area. There are now 64 total reviewed papers in this research.

Articles

Below is a list of articles in this paper. The purpose is to detail the references used, What is found in the referenced article, where these referenced articles are in the paper and how the referenced papers conducted their research.

Year	Author	Title	Key Findings	Research Area	Research Method
2019	Lan, Z., Chen, M., Goodman, S., Gimpel, K., Sharma, P., & Soricut, R.	ALBERT: A lite BERT for self-supervised learning of language representations	NLP model	Albert	Quantitative
2015	Jacob Ström, Kalle Åström, & Tomas Akenine-Möller.	Immersive linear algebra the world's first linear algebra book with fully interactive figures	What is linear algebra	Algebra	Quantitative
2016	Davis, O. B.	Algebra essentials	Matrix, Vectors	Algebra	Quantitative
2016	Brown, P.	Foundations of mathematics: algebra.	Algebra	Algebra	Quantitative
2016	Hoffman, J. W., Jia, X., & Wang, H.	Commutative algebra: an introduction	Algebra	Algebra	Quantitative
2019	Shen, L.-Y., Wang, H., & Wojdylo, J.	Linear algebra	Matrix, Vectors	Algebra	Quantitative
2017	Semmler, S., & Rose, Z.	Artificial intelligence: Application today and implications tomorrow.	Predictions of Technology learning	Artificial intelligence	Quantitative
2020	Russell, S. J., & Norvig, P.	Artificial intelligence: a modern approach	Potential Issues of NLP, Description of NLP methods	Artificial Intelligence, NLP	Quantitative

2016	Rajpurkar, P., Zhang, J., Lopyrev, K., & Liang, P.	SQuAD: 100,000+ questions for machine comprehension of text	NLP model benchmarking tool	Benchmark	Quantitative
2018	Rajpurkar, P., Jia, R., & Liang, P.	Know what you don't know: Unanswerable questions for SQuAD	NLP model benchmarking tool	Benchmark	Quantitative
2020	Wang, A., Pruksachatkun, Y., Nangia, N., Singh, A., Michael, J., Hill, F., Levy, O., & Bowman, S. R.	SuperGLUE: a stickier benchmark for general-purpose language understanding systems	NLP model benchmarking tool	Benchmark	Quantitative
2020	Stanford NLP Group	The Stanford question answering dataset	NLP model benchmarking tool	Benchmark	Quantitative
2018	Devlin, J., Chang, M., Lee, K., & Toutanova, K.	BERT: Pre-training of deep bidirectional transformers for language understanding	NLP model	Bert	Quantitative
2014	Glassmeyer, S., & Smith, P.	Open Law: Technology in service of the rule of Law.	Example of NLP being used in Law	Example of NLP	Quantitative
2019	Bauskar, Shubham; Badole, Vijay; Jain, Prajal; Chawla, Meenu	Natural Language Processing based Hybrid Model for Detecting Fake News Using Content-Based Features and Social Features.	NLP detecting fake information	Examples of NLP	Quantitative
2017	Liu.	Creating Autonomous Vehicle Systems	Machine Learning example	Image Recognition	Quantitative
2019	Wu, Y., Kirillov, A., Massa, F., Lo, W.-Y., & Girshick, R.	Detectron2	Object Detection	Image Recognition	Quantitative
2017	Brett, C.	Court of Appeal Workload statistics 1 January 2017 - 31 December 2017	Number of cases in 2017	Law	Quantitative
2018	Nay, J.	Natural Language Processing and Machine Learning for Law and Policy Texts	NLP in Law	Law	Quantitative
2018	Brett, C.	Court of Appeal Workload statistics for 1 January 2018 - 31 December 2018	Number of cases in 2018	Law	Quantitative
2019	Haney, B. S.	Applied Natural Language Processing for Law Practice	Law NLP	Law	Quantitative

2019	Gheewala, A., Turner, C., & de Maistre, J.-R.	Automatic Extraction of Legal Citations using Natural Language Processing:	NLP in Law	Law	Quantitative
2019	Robaldo, L., Villata, S., Wyner, A., & Grabmair, M.	Introduction for artificial intelligence and Law: special issue "natural language processing for legal texts".	NLP in Law	Law	Quantitative
2019	Chalkidis, I., & Kampas, D.	Deep learning in Law: early adaptation and legal word embeddings trained on large corpora.	NLP in Law	Law	Quantitative
2019	Iqbal, F., Fung, B. C. M., Debbabi, M., Batool, R., & Marrington, A.	Wordnet-Based Criminal Networks Mining for Cybercrime Investigation	NLP in Law	Law	Quantitative
2019	Dale, R.	Law and Word Order: NLP in Legal Tech.	NLP in Law	Law	Quantitative
2019	Brett, C.	Annual statistics	Amount of cases	Law	Quantitative
2019	Lippi, M., Palka, P., Contissa, G., Lagioia, F., Micklitz, H.-W., Sartor, G., & Torroni, P.	CLAUDETTE: an Automated Detector of Potentially Unfair Clauses in Online Terms of Service	NLP Law	Law	Quantitative
2020	Adlam, G.	Snapshot of the profession 2020	Professions in Law	Law	Quantitative
2019	Aghaunor, C. T.; Ekuobase, G. O.	Automatic text summarisation of case law using gate with annie and summa plug-ins.	Use of NLP in Law	Law	Quantitative
2020	Fagan, F.	Natural Language Processing for Lawyers and Judges	NLP in Law	Law	Quantitative
2019	Guss, W. H., Codel, C., Hofmann, K., Houghton, B., Kuno, N., Milani, S., Mohanty, S., Liebana, D. P., Salakhutdinov, R., Topin, N., Veloso, M., & Wang, P.	The MineRL competition on sample efficient reinforcement learning using human priors	Computers playing games	Machine Learning	Quantitative
2019	Madsen, A.	Visualising memorisation in RNNs	How Machines Learn	Machine Learning	Quantitative
2020	Baker, B., Kanitscheider, I., Markov, T., Wu, Y., Powell, G., McGrew, B., & Mordatch, I.	Emergent Tool Use From Multi-Agent Autocurricula	Finding bugs, Playing games	Machine Learning, Gaming	Quantitative

2017	Goldberg, Y.	Neural network methods for natural language processing	Overview	NLP	Quantitative
2018	Dębowski, Ł.	Is Natural Language a Perigraphic Process? The Theorem about Facts and Words Revisited.	Overview	NLP	Quantitative
2018	Farzindar, A., & Inkpen, D.	Natural language processing for social media	How NLP models learn	NLP	Quantitative
2019	Muthusamy, A.	Processing the textual information using open natural language processing.	POS	NLP	Quantitative
2019	Santos, V. dos, Ferreira de Souza, É., Romero Felizardo, K., Massami Watanabe, W., Vijaykumar, N. L., Aluizio, S. M., & Cândido Júnior, A.	Conceptual map creation from natural language processing: A systematic mapping study.	Example of NLP	NLP	Quantitative
2020	Brown, T. B., Mann, B., Ryder, N., Subbiah, M., Kaplan, J., Dhariwal, P., Neelakantan, A., Shyam, P., Sastry, G., Askell, A., Agarwal, S., Herbert-Voss, A., Krueger, G., Henighan, T., Child, R., Ramesh, A., Ziegler, D. M., Wu, J., Winter, C., … Amodei, D.	Language Models are Few-Shot Learners	GPT	NLP	Quantitative
2020	Smith, N. A.	Contextual Word Representations: Putting Words into Computers: Advances in how programs treat natural language words have a big impact in AI.	Overview	NLP	Quantitative
2020	J., S., & Swamy, S.	A prior case study of natural language processing on different domain.	Overview	NLP	Quantitative
2020	Zulqarnain, M., Ghazali, R., Hassim, Y. M. M., & Rehan, M.	Text classification based on gated recurrent unit combines with support vector machine.	Overview	NLP	Quantitative
2020	Granizo, S. L., Valdivieso Caraguay, A. L., Barona	Detection of Possible Illicit Messages Using Natural Language	Detect fake information	NLP	Quantitative

	Lopez, L. I., & Hernandez-alvarez, M.	Processing and Computer Vision on Twitter and Linked Websites			
2020	Fei Song, Jun Sun, & Tao Wang.	Overview of natural language processing technologies and rationales in application.	Explain NLP	NLP	Quantitative
2019	Wolf, T., Debut, L., Sanh, V., Chaumond, J., Delangue, C., Moi, A., Cistac, P., Rault, T., Louf, R., Funtowicz, M., & Brew, J.	HuggingFace's transformers: State-of-the-art natural language processing	A multimodel framework	NLP Framework	Quantitative
2018	Parackal, M., Mather, D., & Holdsworth, D.	Value-based prediction of election results using natural language processing: A case of the New Zealand general election.	NLP used to predict results	NLP in New Zealand	Quantitative
2019	Roh, T., Jeong, Y., Jang, H., & Yoon, B.	Technology opportunity discovery by structuring user needs based on natural language processing and machine learning.	Use NLP for users needs	NLP, Law	Quantitative
2020	Wang, D., Su, J., & Yu, H.	Feature Extraction and Analysis of Natural Language Processing for Deep Learning English Language	NLP in Law	NLP, Law	Quantitative
2017	Young, T., Hazarika, D., Poria, S., & Cambria, E.	Recent trends in deep learning based natural language processing	Recently happened with NLP	Overview of NLP	Quantitative
1989	Davis, F. D., Bagozzi, R. P., & Warshaw, P. R.	User acceptance of computer technology: A comparison of two theoretical models	TAM model	Research	None
2003	Dimitrov, D., & Rumrill, P.	Pretest-Posttest designs and measurement of change	Pretest-Posttest	Research	Quantitative
2018	Creswell, J. W.	Research design: qualitative, quantitative, and mixed methods approaches	Quantitative research	Research	Quantitative
2021	PRISMA	PRISMA	What PRISMA is, PRISMA checklist	Research	Quantitative

2013	Zikmund, W.	Business research methods.	Chi-square, ANOVA	Research	Quantitative
1999	Cramér, H.	Mathematical methods of statistics	Cramér's V	Research	Quantitative
2017	Simpson, B.	Special issue: disrupting technology, disruptive norms: the role of Law in a digital world.	Risks of Technology	Risks of Technology	Quantitative
2014	Crews, K.	The door to a virtual law practice is always open: And the proper use of technology can keep it that way.	Risks of ICT	Security	Quantitative
2017	Henderson, J.	NZ battens down the hatches as global ransomware attack spreads: "Biggest ransomware outbreak in history" hits 99 countries across four continents.	Risks of technology	Security	Quantitative

Table 2 List of articles in PRISMA literature review

2.2 Literature-Map

A Literature map (**Error! Reference source not found.**) is a way to show the themes of the literature covered throughout the research and process of conducting the research. The Literature map shows that the research is divided into nine sections. The sections below discuss what each part of the literature map is about.

Figure 3 Literature review mind map

2.3 New Zealand Law

This section in the literature map, focuses on the current status of new Zealand law, and the increase in cases.

2.3.1 Artificial intelligence

As NLP is a subset of Artificial intelligence, it is essential to talk about Artificial intelligence and the features NLP inherits. This section mainly includes areas on how Artificial intelligence is being used in different areas to give the reader a clearer idea of how Artificial intelligence is used.

2.4 Linear Algebra

This section is about algebra in general and not specifically algebra being used in NLP. Mostly about Linear algebra's data structures like vectors and matrices. This section is detailing an effective way on how to store and retrieve information.

2.5 Machine Learning

The articles focus on what machine learning is and how NLP is a subset of machine learning. Most of it is focusing on the ways machines learn.

2.6 Natural Language Processing

This group of articles about what Natural language processing is, what models are and how they are used.

2.6.2 Models

This is a group of papers discussing the state of the art models currently used for NLP. Including Albert, Bert and GPT. A machine learning model is a file that has been trained to recognize certain types of patterns so that it can become an expert in a certain area. You train a model over a set of data, providing it with an algorithm that it can use to reason over and learn from that set of data to validate and improve itself.

2.7 Examples of NLP

Examples of the NLP section are papers about NLP applications being used in real life. NLP applications include examples inside and outside of the law.

2.7 Outside of Law

Is a sub-section to Examples of the NLP but focuses on examples of NLP outside of the Law field.

2.8 New Zealand

Is a sub-section to Examples of the NLP but focuses on examples of NLP in New Zealand.

2.9 Law

Examples of the Law section are similar to NLP examples but focus on applications used in Law. In addition, this section focuses on the particular vocabulary used in legal English. As the goal of NLP is to understand the meaning of the text, it is crucial to understand the potential misunderstandings that can exist in legal English.

2.10 Potential Issues for NLP

Potential Issues for NLP focuses on papers that point out the issues of NLP. Including issues with the English language and issues inherited from technology.

2.11 Efficiency

Focuses on that NLP models change over time and new models get created providing better performance and accuracy.

2.12 English Language

The English language has lots of rules, and when the researcher made an NLP application, which job is to understand, it is essential to know the rules to build an accurate application. Example rules are grammar rules, idioms, and phrasal verbs.

2.3 Motivation

In 2017 in the appeal court, 657 appeals and 231 applications were filed (Brett, 2017). This large number of appeals and applications is an eight percent increase in total workload than 2016 (Brett, 2017). In 2018 the appeal court received 1003 new matters filed (697 appeals and 306 applications). This increase is an eleven percent increase in total workload compared to 2017 (Brett, 2018). As of 2019, the court of appeal's workload in New Zealand has lessened to currently 586 appeals and 296 applications filed (Brett, 2020). Until 2019, where workload has started to decrease. Workload becoming less either suggests legal professionals are starting to find faster ways to get their legal work done or that 2019 had a lower workload than previous years.

2.3.1 Artificial Intelligence

Artificial Intelligence (AI) meaning has changed since the initial start of AI. The main thought of AI is, can a machine think and simulate human behaviour (Russell & Norvig, 2020). AI can achieve a task in a specific area to a human or more significant level in AI's current state.

2.3.1.1 Areas of Machine learning

The areas that have caused AI to become vaguer in meaning are the number of areas machine learning has been used. The researcher believes the best way to understand how a machine can learn is to detail what machines have achieved.

2.3.1.2 Natural Language Processing

To understand and communicate successfully in a human language. Successfully understanding a human language can help people with their grammar like Grammarly or

predict what will be typed to save time. NLP can also be used for translating one language to another (J. & Swamy, 2020). Answering questions based on human requests like a search engine (J. & Swamy, 2020) and matching law cases by references (Chalkidis & Kampas, 2019).

More details on how NLP does what it does can be found in the Natural Language Processing section.

2.3.1.3 Image Recognition

Figure 4 Detectron2. Facebook Research.. (Source: GitHub, 2021)

Determine the objects in an image (Wu et al., 2019). Determining objects helps understand what the image is and identify items that can be in the way of automatic driving vehicles (Liu, 2017). An example of this is Figure 3, where the individual layered in the white colour is labelled as a ‘person’, and the application is ‘99% sure it is a person.

2.3.1.4 Image Manipulation

Figure 5 GANILLA. Samet Hi. (Source: GitHub, 2021)

To change an image to a particular style (Hicsonmez et al., 2017). Useful for creating an artistic style. For example, in **Error! Reference source not found.**, the application changed the images on the far left into the images to the image's right. The application learns the style by feeding the application with images like the ones in **Error! Reference source not found.**.

2.3.1.5 Audio Recognition

To determine what is being said in an audio file. Useful for auto-transcribing people in meetings or noise suppression (xiph, 2021), so no one will hear background noise when talking with people. For the application to learn people talking in an audio file, the application needs to be fed hours of content and a transcription of the audio file.

2.3.1.6 Audio Manipulation

To change what is being said in an audio file. This audio change can mimic a human speaking from text to speech (Ren et al., 2019). It can also be used to simulate a specific person talking (Prenger et al., 2018) so that you can have something like Barack Obama read to you the little red riding hood. For the application to mimic Barack Obama, the application needs to be fed hundreds of hours of Barack Obama talking.

2.3.1.7 Video Games

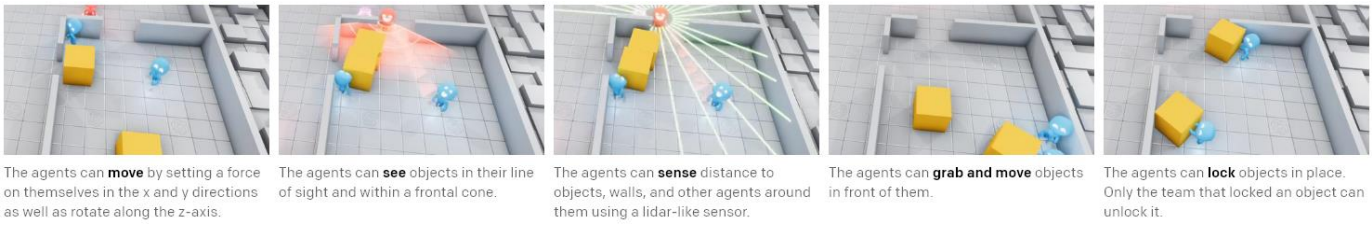

Figure 6 Multi-Agent Interaction. OpenAI. (Source: OpenAI, 2021)

Have a computer play a video game(Guss et al., 2019). Act as a mechanical player to test levels and find bugs in games (Achiam & Amodei, 2019; Baker et al., 2020), even in procedural environments (Cobbe et al., 2019), and compete in tournaments (OpenAI, 2018).

2.4 Linear Algebra

Part of Machine learning is math, specifically linear algebra, due to the additions mentioned below. For NLP, linear algebra is needed for storing words you will process into numerical values.

2.4.1 Vectors

One of the most essential and fundamental concepts in linear algebra is the vector. They can also be used for velocities, forces, acceleration (O. B. Davis, 2016). For NLP, they are used to quickly find words given to it and store words it has learned (Smith, 2020). Vectors are a sequential one-dimensional array of numbers ([1,3,7,8]). A vector is dynamic, so size increases with the insertion of elements. The reason we use this is to turn text data into numerical data. Changing text data into numerical data means we turn what would be a vector of the words we want the NLP application ([The, quick, brown, fox, jumps, over, the, lazy, dog]) and turn the sentence into a vector-based on the known words and the position that word is in the text.

Position	Orange	Fox	Jumps	The
1	0	0	0	1
2	0	0	0	0
3	0	0	0	0
4	0	1	0	0

Table 3 Storing the position of words

In the example above, each column is a known word, and each row is a position. The word 'fox' does not appear till the four-word, so there is a one on the fourth row.

2.4.2 Matrices:

They are two-dimensional arrays of numbers (Shen et al., 2019). A Matrices can help detail the 'features' of a word.

	Femininity	Youth	Royalty
Man	0	0	0
Woman	1	0	0
Boy	0	1	0
Girl	1	1	0
Prince	0	1	1

Table 4 Features of words

In the example above, the column is the features, and each row is a word. A "Girl" is considered feminine and young. Simultaneously, a "Woman" is deemed feminine but rather than young. A Woman is considered mature because of those differences; the program can differentiate the two words because of the features' difference.

2.5 Machine Learning

2.5.1 Introduction

NLP is a subset of machine learning because NLP inherits many other features that are mentioned below. Some of these features are Classifiers, Clustering and Regularisation.

2.5.2 Clustering

Clustering is the task of grouping a set of similar objects into the same group, which is called a cluster (Russell & Norvig, 2020). A way of grouping objects can be the features of a word like a car, bus, and train belonging to the transportation group.

2.5.2.1 Spectral

In practice, Spectral Clustering is very useful when the individual clusters' structure is highly non-convex or, more generally, when measuring the cluster's centre and spread is not a suitable description of the complete cluster (Russell & Norvig, 2020). For instance, when clusters are nested circles on the 2D plane.

2.5.2.2 Self Organizing Map (SOM)

Self-organising maps differ from other artificial neural networks as they apply competitive learning instead of error-correction learning. In a sense, they use a neighbourhood function to preserve the topological properties of the input space.

2.5.2.3 Hierarchical (HCA)

In data mining and statistics, hierarchical clustering is a cluster analysis method that seeks to build a cluster hierarchy with the aim of supporting efficient scans, range indexing (Böhm et al., 2019). Strategies for hierarchical clustering generally fall into two types:

Agglomerative: This is a "bottom-up" approach: each observation starts in its cluster, and pairs of clusters are merged as one moves up the hierarchy.

Divisive: This is a "top-down" approach: all observations start in one cluster, and splits are performed recursively and will continue going down the hierarchy and keeps splitting until complete.

2.5.3 Training

As the goal is to build a machine learning application, one of the essential steps is training. This including methods like scoring, data splitting, training, validation, and testing.

2.5.3.1 Score

Scoring is also called prediction and is the process of generating values based on a trained machine learning model, given some new input data (Böhm et al., 2019). Scoring is typically used during validation and testing.

2.5.3.2 Data Splitting

The data you use to train your application is in three categories:

2.5.3.3 Training

In the case of a supervised classification problem, you would feed in your data with its classification for the learning algorithm to learn (Goldberg, 2017).

2.5.3.4 Validation

The validation set is usually sampled from the training set. It is used in conjunction with the training set during training to fine-tune some of your parameters according to a metric to judge its success by (Goldberg, 2017).

2.5.3.5 Test

The test set is used to evaluate the performance of your model. Essentially, you do not supply your model with labels but instead what your model to predict (Goldberg, 2017).

2.5.4 Classifiers

A classifier is a hypothesis or discrete-valued function used to assign (categorical) class labels to particular data points. This classifier could be a hypothesis for labelling emails as spam or non-spam. These classifiers typically are taught by teaching the machine the features of the word (D. Wang et al., 2020). An example of the types of features a word can have is with the table, **Error! Reference source not found.**.

2.5.5 Regularisation

This technique discourages learning a more complex or flexible model to avoid the risk of overfitting. To avoid this what is typically used is early stopping, weight decay and dropout.

2.5.5.1 Early Stopping

We keep another set of data as the validation set, and as we go on training, we keep a record of the loss function on the validation data. When we see no improvement in the validation set, we stop rather than going through all the epochs.

2.5.5.2 Weight Decay

Weight Decay is a regularisation technique applied to the weights of a neural network. We minimise a loss function compromising both the primary loss function and a penalty on the Norm of the weights.

2.5.5.3 Dropout

Dropout is a regularisation technique for neural networks that drops a unit (along with connections) at training time with a specified probability. At test time, all units are present but with weights scaled by.

2.6 Natural Language Processing

Natural Language Processing is a study on language and its structure for computers to understand humans' interaction (Roh et al., 2019). NLP has two types of learning: supervised and unsupervised (Roh et al., 2019). Supervised learning is learning like a student learning from a teacher. NLP also can have unsupervised learning (Young et al., 2018). NLP can learn

from sentences, documents, and the structure of the material is written (Roh et al., 2019). NLP can lead to possible solutions like machine writing, machine translation, and answering questions(Fei Song et al., 2020). There seem to be two ways NLP methods gather information: Chunking and Part-of-speech (POS) tagging. Chunking is expressing one object with other words to create a group of data; for instance, the word 'transportation' can include cars and buses as transport methods (Roh et al., 2019). POS is similar to Chunking, but POS groups words it reads into nouns, pronouns, adjectives, and verbs (Roh et al., 2019; Young et al., 2018). Tokenisation is also used to split joined words like 'don't' into 'do' and 'not' for other processes like POS, where a verb and not an adverb (Muthusamy, 2019).

2.6.1 Problems NLP faces

2.6.1.1 Grammatical issues

When analysing meaning in a text, it is assumed that the text you are gathering from is grammatically correct. Typically NLP is learned from a grammatically correct text, and the text is assumed to be grammatically correct (Russell & Norvig, 2020). With this assumption, meanings in a document text can be misunderstood if the text is grammatically incorrect.

One way to check for spelling is by using an in-vocabulary and out-of-vocabulary (OOV), a dictionary of known correctly spelt terms and check the words correctly spelt before sending the text to the NLP application. We can use this dictionary in the POS stage when dealing with unknown or misspelt words.

2.6.1.2 Ambiguity

Occasionally the writer of a document writes it in a way where the reader can misinterpret the meaning. An example of ambiguity is "Saw her duck." Can lead to meanings like:

- Saw her duck (animal)
- He saw her move to evade something

Due to ambiguity, the NLP application cannot interpret a single meaning for a sentence but rather the probability distribution of possible meanings (Russell & Norvig, 2020).

2.6.2 Models

An NLP model has a different concept or behaviour (Wolf et al., 2019). Each model is different; this leads to each model doing better than others relative to specific tasks (Rajpurkar et al., 2018; Stanford NLP Group, 2020; A. Wang et al., 2020). For a multi-

service NLP solution at the initial stage, there will need to be a model possibly for each project requirement. During development, there will most likely be a change to creating a model specific to the project. The transformers framework is available to save some time integrating the many types of models available; some models will be mentioned below, like GPT, Albert (Wolf et al., 2019). Russell et al. also state that NLP models are challenging because they are substantial and continuously changing. The models mentioned are, at best, an approximation. The researcher of this paper planned to start with the simplest approximation and move up from there (Russell & Norvig, 2020). Most models are trained on carefully edited texts, usually newspapers and books (Farzindar & Inkpen, 2018).

2.6.2.1 Transformers

Transformers provide a general-purpose architecture for pre-existing models like BERT, GPT-2, and own developed Natural Language Understanding and Natural Language Generation models.

2.6.2.2 Albert

Albert is from Google's previous model BERT. BERT's focus was on a wide range of tasks, such as obtaining user questions, answering their questions and understanding the relationship between two sentences (Devlin et al., 2018). Albert is a revised edition of Google's previous model BERT, but Google found that this model was too large and needed to be smaller, as it takes too long for the model to come to conclusions (Lan et al., 2019). The model changes lead to improving the desired answers from questions and saying if it could not answer the question with confidence (The Stanford Question Answering Dataset, 2020).

2.6.2.3 GPT

GPT-2 focuses on Machine Writing, which can summarise documents into a paragraph (Radford et al., 2019; Solaiman et al., 2019). With this model, it is possible to answer questions, but Albert seems to achieve better (A. Wang et al., 2020). GPT-2 is a continually developing model. As it is a continuously developing model, this means that the previous statement can become false in time (Solaiman et al., 2019; Ziegler et al., 2019). An example of it being false over time is GPT-3, a new revision of the model. This new model achieves more accurate results, achieve more than just the English language; however, GPT-3 is a much larger model (Brown et al., 2020).

2.7 Examples of NLP

When it comes to understanding NLP, it is best to see how other people in the world are using NLP. This section will discuss how people have used NLP to summarise text, detect fake information and provide information to a user based on queries from the user (Robaldo et al., 2019).

2.7.1 Fake News

A team of students intended to detect fake content based on NLP. The students' NLP application was taught with 2000 news articles with six different machine learning classifiers. The news articles were labelled either legit or fake. The students' application predicted news articles through Headline, Body, Description, Source, and Authors. They found that fake news typically had headlines that intended to 'grab' the reader's attention. The fake news articles' body was more focused on the writer's belief, while real news acted compared to two ideas or points (Bauskar et al., 2019).

2.7.2 ROSS Intelligence

The purpose of ROSS Intelligence is to give the user the ability to ask the system questions, and the system performs legal research based on its understanding of that question and offers users of the system a Google search like a list of items to look at (Semmler & Rose, 2017).

2.7.3 Automatic Text Summarisation

Aghaunor and Ekuobase created a tool to summarise the Nigeria Supreme Court case law. Summarised content led to 20% smaller content than the original. The summarised material was considered to be 83% of the correct summarisation (Aghaunor & Ekuobase, 2019).

2.7.4 Beagle

Beagle is for users who need assistance on their legal contracts but do not know or have the experience to complete the task themselves. Users upload their contracts onto their business platform. Their natural language processing system identifies points of attention for the user who uploaded the contract to review and analyse how this contract will need to be filled in, have an undesired format or is missing information that needs to be added to be a suitable contract (Semmler & Rose, 2017).

2.7.5 Data mining

NLP can be used to gather the success and failure rate from cases that can then be used for statistical purposes to find a general chance on future cases and their success rate (Muthusamy, 2019).

2.8 NLP in New Zealand

Currently, it is difficult to find any information on New Zealand using Natural language processing in Law. However, what was found for NLP in New Zealand is that NLP is being used for identifying influenza-like illness and predicting election results. For Identifying influenza-like illness, Jayden MacRae's team started by searching patients who have had an influenza-like illness using weight and age to understand the problem. With their model of what they believed to be the characteristics of this illness when they tested it, the team could correctly guess if they had the illness at above 95% success rate (MacRae et al., 2015). Macrae's team also had to use expressions like "fe?ve?r(([iey]sh)|y|s?)" for different ways people may say a person has a fever and to check for spelling errors (MacRae et al., 2015). For predicting election results, MacRae's team created a survey for people to detail what issues mattered to them most in the election and what made them see someone positively. Mathew Parackal and his team used an MNL model, a model in which the creator will generalise a variable into where two outcomes can occur. Their model was validated with the final election results (Parackal et al., 2018). These articles indicate that NLP can be used in New Zealand; however, it cannot prove if it should be used in Law at this time.

2.9 NLP in Law

In some way, the law has always been data and data can be observed, understood and manipulated by today's machines (Fagan, 2020) so what comes is how NLP is being used. NLP has been considered to be used to summarise the body of texts (Haney, 2019). As documents can be multiple pages long, summarising the text into smaller pieces of information saves time for the legal professional, giving them more time to find more research (Nay, 2018). Another is Question and answering, where the legal professional provides a query and finds a short phrase or documents that precisely answers a user's question (Haney, 2019). Another theorised way NLP could be used is by reviewing documents by categorising documents to ensure that research found relates to each other (Haney, 2019). Gheewala can extract legal citations by teaching a machine that "Article III(b)

of the Treaty" can be seen as a reference to another document and that this referenced document should be used to provide context (Gheewala et al., 2019). Finally, NLP can also automatically detect unfair clauses in online terms of service (Lippi et al., 2019).

2.10 Potential Issues for NLP in Law

There is a believed potential issue with the move to make technology have the capabilities to do more parts of people's workload. Some of NLP implications can save time for firms who otherwise need to hire associates to sift through contracts and conduct legal research. NLP is considered more that things will require restructuring and people will have different workloads, but there are suggestions that some positions may become obsolete like paralegals (Semmler & Rose, 2017). There are suggestions that artificial intelligence will create a wide range of access for people to use a service that previously could only be accomplished by large teams of highly educated attorneys. NLP leaves the potential for smaller firms to compete with larger firms. NLP may also lead to larger firms restructuring as customers could go down the street to a smaller firm that provides the same services (Semmler & Rose, 2017). There are also possible futures where people will not need defined knowledge as machines will tell them what things are (Semmler & Rose, 2017). For projects like Beagle's and giving users the ability to upload files, files must be stored securely where unauthorised personnel cannot access personal information (Semmler & Rose, 2017). The connection will need to be encrypted, and firewalls installed to restrict user's access (Semmler & Rose, 2017). When a system on which people rely heavily has the potential danger of ransomware where access can be under lock and key, the business may need to pay a person or group money to regain access. New Zealand and the world became frightened from ransomware when WannaCry hit the world (Henderson, 2017). Integrating technology into a Law business can also lead positively, where business practices are in a virtual environment (Crews, 2014; Glassmeyer & Smith, 2014). A virtual environment can lead to gathering more customers and a broader reach of all files and services. As previously mentioned, with people's workload changing, it is possible to accommodate more customers while minimising hiring more people.

People have concerns about where online information is stored, the abundance of online information, and concerns about what information we should put out on the internet (Simpson, 2017). An issue for technology like NLP, where the whole purpose is to find

patterns and gather essential information for the person receiving what comes out of the NLP process. An example of the information you can find on people has been seen when Cambridge Analytica gathered all this information from Facebook saw this act of using some information as inappropriate misuse of private information and that the Law needs to prepare for such possibilities (Simpson, 2017).

2.11 Efficiency

As technology progressed through Moore's Law's effect on GPUs, TPUs and efficiency gains from algorithmic progress (Hernandez & Brown, 2020) have made it easier to run NLP models. They will continue to get more effortless in the future.

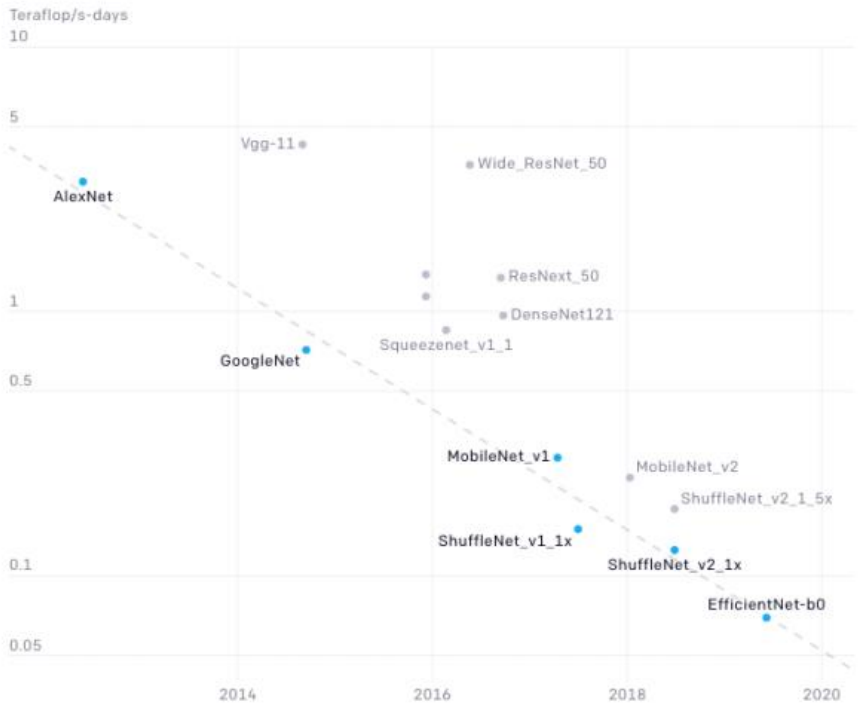

Figure 7 44x less compute required to get to AlexNet performance seven years later

Error! Reference source not found. from Hernandez & Brown, 2020, shows that people are archiving similar results from AlexNet's results but requiring less hardware strain as each new model iterated over algorithms and new ways to process information.

2.12 English Language

NLP is about understanding the meaning of natural language, which means understanding the English language. What needs to be discussed is the English language's challenges. English is the primary focus because English is the most popular language in New Zealand and legal

documentation is primarily English. The researcher needed to know these so that when the application encounters one of these situations, the application will deal with it correctly. This section goes into what makes trying to understand the English language difficult. Additionally is going into the extra challenges of understanding legal English and going into some English language linguistics.

2.12.1 Trickiness of English

The challenging parts are the lack of clear grammar rules because English is a product of various linguistic traditions (Haigh, 2018). Idioms are words whose combined meaning is different from the individual word meaning; for example, the expression ‘over the moon’ means the person is happy (Haigh, 2018), while the literal feat of going over the moon is quite challenging. There are many different ways of saying the same thing in English because it draws from different linguistic traditions. E.g. when talking about employment, you say, calling, career, profession, employment, job, work, occupation, or vocation (Haigh, 2018).

2.13 What makes Legal English difficult

2.13.1Odd habits of legal Law

Sentences often have peculiar structures and wording. For example, ‘due performance by the employer of the contract in the manner ‘hereinafter’ appearing’ means that the employer must carry out the contract terms in the way the contract specifies in the provisions lower down in the document than this one. Punctuation is used insufficiently. Punctuation is particularly the case in documents relating to lands, such as deeds and conveyances. Foreign phrases are sometimes used instead of English phrases (e.g. ‘inter alia’ instead of among others, or void ab initio instead of invalid from the start). Unusual set phrases (null and Void, all and sundry). Unusual pronouns are used (the same, the aforesaid). The use of ancient / commonly unused words in contracts and other legal documents like; here-, there- and where- (hereof, hereinafter, whereas) (Haigh, 2018).

2.13.2 Complex and unfamiliar words and phrases

Legal terms of art

Legal terms are words and phrases with a precise and fixed legal meaning, which other words cannot usually replace. Some of these will be familiar to the law person (e.g. patent, share royalty). Others are generally only known to lawyers (e.g. bailment, abatement)

Legal jargon

Legal jargon comprises words used by lawyers that are difficult for non-lawyers to understand. Jargon words range from near-slang to almost technically precise words. Well-known examples of jargon includes things like a boilerplate clause (a standard clause included in a contract that helps define the relationship between parties but has no direct relevance to the subject matter of the contract) or a Corporate veil (the concept that a company has a legal personality separate from that of its shareholders that protects them from personal liability for the companies actions) (Haigh, 2018). Other obscure words with highly specialised meanings and are therefore encountered in legal documents. Include emoluments (a person's earnings, salaries, fees, wages, profits and benefits in kind) or provenance (the origin or early history of something) (Haigh, 2018).

The legal meaning may differ from the general meaning

As a legal term of art, Distress refers to the seizure of goods as security for an obligation's performance. In ordinary English, it means anxiety, pain or exhaustion.

2.14 The importance of Legal English

Legal English is essential because it provides how Law is articulated, applied, and enforced when written in English. Law has two types, national and international. National Law provides how countries govern the relationship between the state and its subjects (criminal law) and the subjects themselves (civil law). International Law provides how international relations between countries (public national law) and between individuals and organisations based in different countries (private international law) are regulated. The National Law, of course, reflects the languages used in each country (Haigh, 2018).

2.14.1.1 Prepositions

Prepositions are single word (at, on, by, to), Prepositions are a combination of two words (as of, as regards) or three words (in relation to, in accordance with). They have used a connection showing the relationship between a noun or pronoun and some other word in the sentence. For example, 'the judge was in the court', the preposition 'in' shows the relationship between the judge and the court. Prepositions are primarily used to show the place, position, time, or method in relation to a noun or pronoun in the context of the sentence in which it appears (Haigh, 2018).

2.14.1.2 Pronouns

A pronoun is a word used instead of a noun to indicate someone or something already mentioned or known (I, You, This, That). Pronouns are used to avoid repeated use of a noun. They are usually used to refer back to the last used noun. Legal drafters rationally avoid personal pronoun instead replace them with the said, the aforesaid or the same. This replacement is fear of ambiguity when it is unclear which noun the pronoun is referred to (Haigh, 2018).

2.14.2Adjectives

An adjective is a word used to describe a noun or make its meaning clearer, like ‘excellent’ in the sentence 'an excellent horse' this creates the meaning that this is a good horse. Some adjectives are described as incomparable adjectives, meaning they describe something that can only be absolute (Haigh, 2018). Such as Void, Void cannot primarily be void, or void can not become more Void.

2.14.3 Collective nouns

A collective noun (or mass noun) refers to a group of people or things (Haigh, 2018). An example of a collection can be committee, audience and staff. Meaning there won't be a sentence like ‘allow the **audiences** in’ as the audience is already the word for a group of people.

2.14.4 Un-countable nouns

Words that do not have a plural form make it harder to determine if multiple being referred. An example is ‘knowledge’, not to say they can be modified to be countable; for example I have received some information can be perceived as different information that has been received from information that is already been received.

2.14.5 Past Tense

People refer to an item in time differently. People can refer to a moment perfectly to 28 May 2018, and the reader will know they refer to that moment in time. However, items like ‘the judge **granted** an order’, the reader can only assume that prior an order was given but the time is not directly mentioned. When building a model, it will be important when dealing with time; it is best to search for the time in previous sentences or if the legal professional found other research that can give the time of an item.

2.14.6 Verb forms

2.14.6.1 Subjective from

Subjective as being an obscure grammatical construction. Useful as a sentence set to demonstrate a way for proposals or bring forward ideas without committing to them (Haigh, 2018). One example of this is "The most important thing for this firm is that they accept our offer", as this does not confirm that the firm has accepted their offer but is recommended to take this offer from another party.

2.14.7 Active and passive voice

Using an active voice in a sentence acts upon the object through the verb in such a way to make the relationship between subject and object, "I broke your priceless painting". However, for a machine learning the sentence "I broke your priceless painting", the challenge becomes who is 'Your', 'I' and what 'painting' was broken. Using a passive voice, the sentence is merely acted upon by something unknown, "Your priceless painting was broken". Legal drafters tend to use passive forms (a meeting has been called) because this form creates an indirect and formal tone with which lawyers instinctively feel comfortable. However, for a machine learning the sentence "Your priceless painting was broken", the challenge becomes who is 'Your' and what 'painting' was broken (Haigh, 2018).

2.14.8 Citations

Referencing cases is an integral part of being a legal professional in researching an upcoming case. References are typically in the format of 'Enterprise Act 2002' when referencing statutes and 'Donoghue v Stevenson [1932] AC 562 (HL)' when referencing cases (Haigh, 2018).

2.15 Research Questions

The literature was used to influence the research questions to determine if this was feasible and find the research gap. Literature influencing the questions leads to questions being made due to the literature so that the literature does not answer the questions. Otherwise, there is no research gap. The research questions are listed below:

RQ 1. What are the factors that allow Natural language processing to work within New Zealand Law System?

i. The main research question is to discover the factors to allow for NLP to be integrated as the literature in law found in the sections NLP in Law and NLP in New Zealand. Those examples made an NLP application but did not test it with people in the legal field. That lack of people to test the NLP features was to find if the factors are the same or if the factors change now that participants are involved. As 'factors' can be many things, it is best to split this question into more minor questions to answer this question. These minor questions can be seen below.

RQ 1.1. What will be the variation of what the lawyer perceives as useful depending on which department the lawyer belongs to?

i. RQ 1.1. comes from the Examples of NLP, Potential Issues for NLP in Law, and English Language sections where NLP applications are made depending on who is the attended audience.

RQ 1.2. What are the factors of the lawyer affect how comfortable they are with technology?

i. A question focusing on a lawyer's comfortability comes from finding examples of NLP and privacy issues for NLP in Law that created if people are creating NLP applications. However, there are concerns on how that application is made then what are the actual issues, and are these concerns still valid when tested.

RQ 1.3. How will a lawyer's fears affect their attitude to technology?

i. A lawyer's fears come from privacy issues for NLP in Law, where if there is plenty of literature stating their concerns caused the researcher to assume that there is a perceived fear of this technology.

RQ 1.4. What is the use of similar technology affect a person's ease of use with this technology?

i. This question was made from Examples of NLP and NLP in Law that if there are already existing technologies, will participants' opinions change relative to if they have used this technology before.

RQ 1.5. Is the technology beneficial?

i. If the technology is beneficial if these NLP technologies already exist, are they better, or is traditional work practice still more practical.

RQ 1.6. How will the accuracy of the application be different depending on what department the lawyer is in?

i. The interest in the accuracy of the application did not come from any literature. If the examples could achieve what they considered an accurate result, will that still be satisfactory. Additionally, the question came from the English language section, where some particular challenges and patterns can cause the literal meaning to be misinterpreted. If you are building an application, you want to be sure that the information you are creating is correct. However, the researcher is not a legal professional, so creating this question to ask participants became important.

RQ 1.7. How will the features of the application change a lawyer's perception of the technology?

i. This question came from researching 'Examples of NLP'. Suppose there are many examples made for different reasons. Will the desired features the participants want instead of what was found from literature and see if the challenge of the desired features is possible (text summarisation, detecting false information).

2.16 Conclusion

Legal English has its way of writing, and that must be kept in mind to ensure results for the application is accurate. Most of the need of knowing a bit of linear algebra is a different way to store and manipulate information. When it comes to machine learning, you need to know about data splitting to ensure that teaching a machine is accurate. Early stopping knows when to stop teaching a machine more things when there is no improvement. Machine learning has many different fields but makes a clear idea of what machine learning is, and it can be used in

so if the reader is interested in it, there are many areas you can look into. The central theme to teach a machine to learn the meaning of information is feeding the application example information like text, audio, or video.

3.0 Methodology

The purpose of pre-test, experiment, and post-test is to allow for physical experiments and gather input from people before and after the experiment. The process is about gathering information before the person uses the feature and then collect feedback again after legal professionals experience using the NLP application (Dimitrov & Rumrill, 2003). The methodology section also readdresses the research questions, addresses the hypotheses, how research questions and hypotheses are linked, and addresses the tools used to process and gather survey results.

3.1 Worldview

The selection of research design is based on a philosophical worldview. According to Creswell (Creswell, 2018), there are four philosophical worldviews for research. The researcher chose Postpositivism for this research.

Postpositivism	Constructivism
• Determination • Reductionism • Empirical observation and measurement • Theory verification	• Understanding • Multiple participant meanings • Social and historical construction • Theory generation
Transformative	**Pragmatism**
• Political • Power and justice oriented • Collaborative • Change-oriented	• Consequences of actions • Problem-centered • Pluralistic • Real-world practice oriented

Figure 8 Philosophical worldview (Research Design, Creswell 2018)

The researcher chose Postpositivism (Figure 8) because it allowed the researcher to work with people in the legal world, regardless of the problems that came in doing so (Limitations). However, with the opportunity, it does mean the researcher needs to determine the effects or outcomes through the means of experiments (Pre-test - Post-test). When using

experiments, it is essential to reduce the ideas into a smaller form to test, such as the variables that comprise hypotheses (Hypotheses) and research questions (Research Questions).

3.2 Objective

This study aimed to find the factors in law case studies. Case studies are widely accessible and create a Natural language processing application and test the effectiveness of not using the application and using the application. This research is: the increase in cases, increase in lawyers, and matters are being carried over to the following year. The NLP application goal is to assist lawyers in their work while ensuring that the application is not replacing workers. The process compared the process they did to achieve their day-to-day tasks and compared it with their experience using the NLP application to perform their day-to-day tasks effectively.

3.3 Research Model and Hypotheses

This research uses the conceptual framework of the Technology Acceptance Model (TAM). The TAM is an information systems theory that models how users come to accept and use technology.

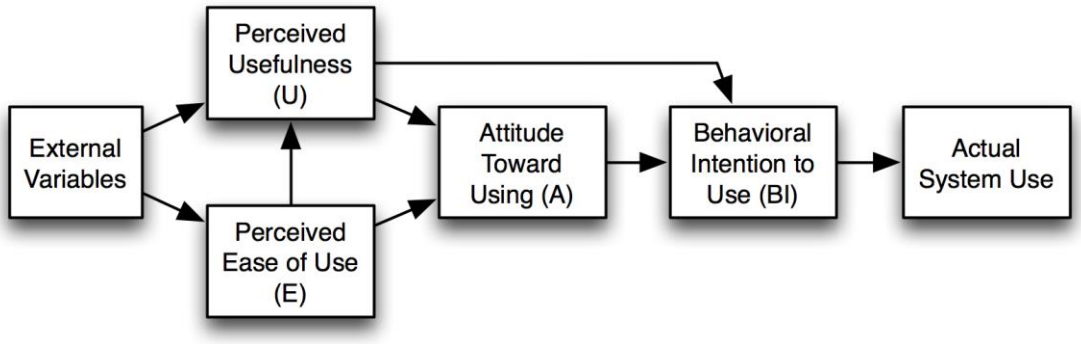

Figure 9 Technology Acceptance Model (TAM) by David et al. (1989)

Perceived usefulness – This is considered when this application will increase his or her job performance within an organisation (F. D. Davis, 1989).

Perceived ease-of-use – When a person believes that this application is easy for them to use, they will have a positive attitude towards the application (F. D. Davis, 1989).

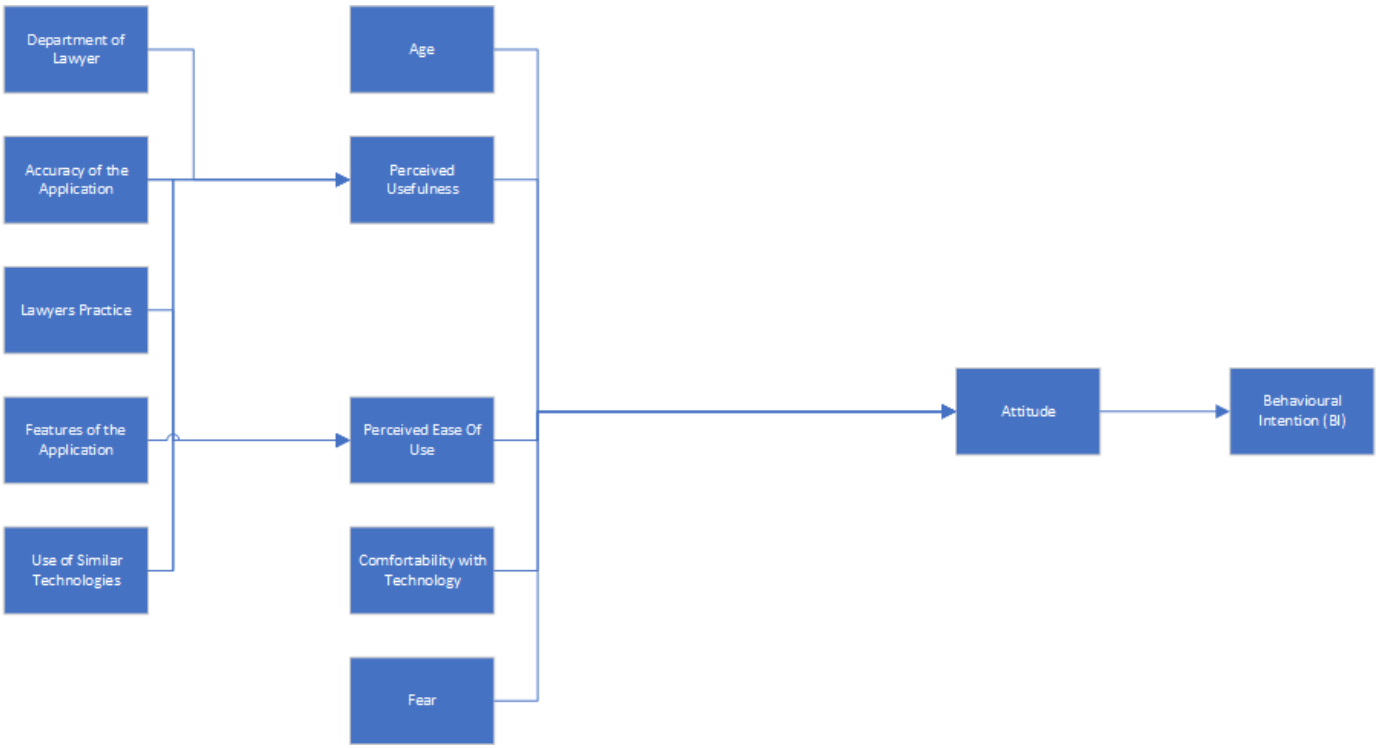

Figure 10 Modified TAM Model

A transformed TAM model illustrated in **Error! Reference source not found.** identifies the relationships and relate the below-mentioned hypotheses with the corresponding dependent and independent variables.

3.4 Pre-test - Post-test

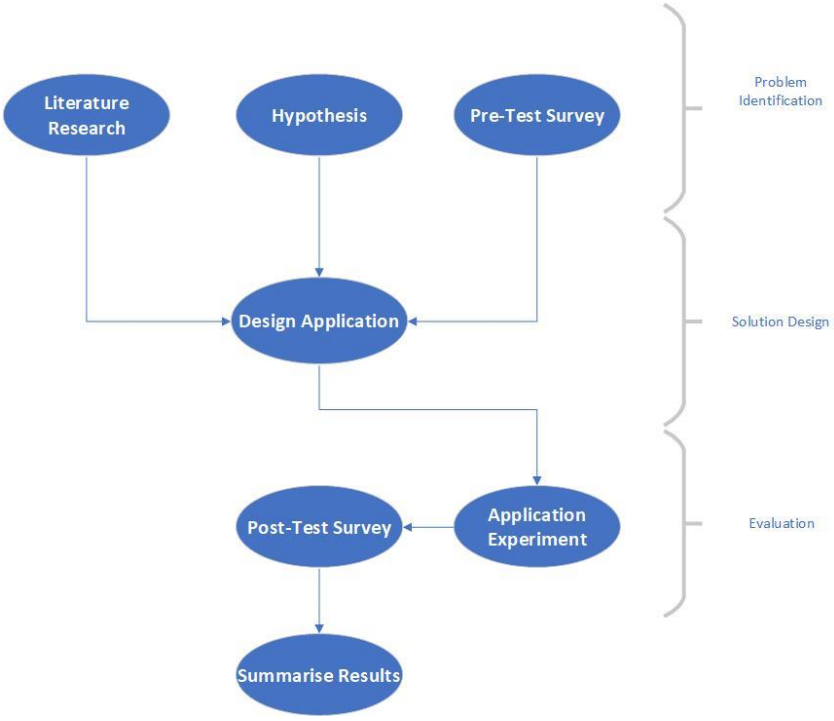

Figure 11 Pre-Test Post-Test Diagram

Pre-test and post-test are about comparing groups both before and after they have received treatment. Concerning the researcher's study, the experiment will be carried out with the application the researcher has developed.

Comparing groups before and after can help the researcher learn more about their attitude to the application to see if their attitude changes. The researcher can also see how the participant's differences with and without using the NLP application. For example, if the person perceives the applications work as valuable, then a positive number. On the other hand, if they believe the application work is not valuable, then a negative number.

Pre-test

Type	**Rating**
Effectiveness in work	-1 to 1
Accuracy of their work	-1 to 1

Satisfaction in their work	-1 to 1
Other thoughts of their work	-1 to 1
Total	-4 - 4

Table 5 Pre-test determine the rating

The ratings are based on the modified TAM model '**Error! Reference source not found.**'. Positive perception is '1', and a negative perception is '-1'. The goal of these ratings is to discover how lawyers perceive the way they handle cases. Keeping sections open avoids the assumption that lawyers handle cases that can be seen by the lawyer as the best way to handle cases and that lawyers can see that it needs improvement.

Post-Test

Type	**Rating**
Effectiveness in the applications work	-1 to 1
Accuracy of the applications work	-1 to 1
Satisfaction in the applications work	-1 to 1
Other thoughts of the application	-1 to 1
Total	-4 - 4

Table 6 Post-test determine the rating

The ratings are still based on the modified TAM model '**Error! Reference source not found.**'. In the post-test, the lawyers have experimented with the application. Lawyers have compared the NLP application and how it compares with how they were previously handling cases.

3.5 Research Questions

The primary focus of this research was to understand the factors to build an application for the Law. Thus, the main research question and its following sub-questions are based on what the researcher thought the outcome would be when researching literature. The items are listed below:

RQ 2. What are the factors that allow Natural language processing to work within New Zealand Law System?

RQ 1.1. What will be the variation of what the lawyer perceives as useful depending on which department the lawyer belongs to?

RQ 1.2. What are the factors of the lawyer affect how comfortable they are with technology?

RQ 1.3.How will a lawyer's fears affect their attitude to technology?

RQ 1.4.What is the use of similar technology affect a person's ease of use with this technology?

RQ 1.5.Is the technology beneficial?

i. Is traditional work practice better?

RQ 1.6. How will the accuracy of the application be different depending on what department the lawyer is in?

RQ 1.7. How will the features of the application change a lawyer's perception of the technology?

3.6 Hypotheses

H1. Fear of technology will affect the participant's attitude to using technology

H2. Accuracy of the application will affect the efficiency of lawyers' work

H3. The information lawyers perceive useful will have an impact on their opinion on the specific technology

H4. High accuracy exhibited by the NLP application will affect the perceived usefulness of the technology

H5. The lawyer's practice will affect how they perceive the usefulness of the application

H6. Lawyers prior experience with similar technology will change the ease of use of the technology

H7. A lawyer's area of practice will require specific features of the NLP application

H8. A lawyer's expertise will require more advanced features in comparison to just graduated lawyers

H9. A lawyer's who has had previously used an NLP application will be more effective.

3.7 Linking

The purpose of linking is to establish a relation between survey questions, research sub-questions, hypothesis, and literature review.

3.7.1 Survey Question with Hypothesis

An online survey will be used to gather the information for this research. The following table signifies the test that would be evaluated to measure the survey questions' responses (Survey Questions).

Survey Question	Measurement Type	Hypothesis
Pre-SQ1	Nominal	H4
Pre-SQ2	Nominal	H6, H9
Pre-SQ3	Nominal	H6, H9, H10
Pre-SQ4	Nominal	H10
Pre-SQ5	Nominal	H11
Pre-SQ6	No Measurement (open-ended question)	H3, H5, H7
Pre-SQ7	Ordinal	H3, H5, H7
Pre-SQ8	No Measurement (open-ended question)	H2, H3, H5
Pre-SQ9	No Measurement (open-ended question)	H2, H3, H5
Pre-SQ10	Nominal	H4, H7
Pre-SQ11	Nominal	H1
Pre-SQ12	Nominal	H2, H3, H5
Pre-SQ 13	No Measurement (open-ended question)	H8, H9, H10

Table 7 Measurement type for corresponding Pre Test Survey Questions

Survey Question	Measurement Type	Hypothesis
Post-SQ1	Nominal	H4
Post-SQ2	Nominal	H6, H9
Post-SQ3	Nominal	H6, H9, H10
Post-SQ4	Nominal	H10
Post-SQ5	Nominal	H11

Post-SQ6	No Measurement (open-ended question)	H3, H5, H7
Post-SQ7	Ordinal	H3, H5, H7
Post-SQ8	No Measurement (open-ended question)	H2, H3, H5
Post-SQ9	Nominal	H2, H3, H5
Post-SQ10	No Measurement (open-ended question)	H4, H7
Post-SQ11	Ordinal	H1
Post-SQ12	Ordinal	H2, H3, H5
Post-SQ13	Ordinal	H2, H3, H4
Post-SQ 14	No Measurement (open-ended question)	H8, H9, H10

Table 8 Measurement type for corresponding Post Test Survey Questions

3.7.2 Research questions with survey questions

Error! Reference source not found. interconnects the survey questions with relevant research questions. All the survey questions are in the appendix (Survey Questions).

Research Question	Literature Review	Survey Questions
RQ. 1.1	2.1	Pre-SQ6, Pre-SQ9, Pre-SQ11
RQ. 1.2	2.2	Pre-SQ6, Pre-SQ9
RQ. 1.3	2.3	Pre-SQ5, Pre-SQ6, Pre-SQ7, Post-SQ5, Post-SQ6
RQ. 1.4	2.3	Pre-SQ5, Pre-SQ6, Pre-SQ7, Pre-SQ1, Pre-SQ 12, Post-SQ5, Post-SQ6
RQ. 1.5	2.1, 2.2, 2.3	Pre-SQ5, Pre-SQ6, Pre-SQ7, Pre-SQ8, Post-SQ7, Post-SQ11, Post-SQ9
RQ. 1.6	2.2	Pre-SQ5, Pre-SQ6, Pre-SQ9, Pre-SQ10, Post-SQ5, Post-SQ6
RQ. 1.7	2.1	Pre-SQ 10, Pre-SQ 11, Post-SQ14

Table 9 Linking research question with survey questions

3.8 Data Collection

The researcher used Qualtrics as its survey tool and gather data through a survey. The researcher created a questionnaire base on the literature review, both in English for ethical approval. The researcher had pre-tested the survey among friends in Law, tested the process and collected advice for the final revision. Once the final version was created, an online link was made so the Lawyers could complete the survey in their own time. The pre-test surveys were sent 1st of November and ended on the 12th of December, and the second set February 28 – 15 April. Then the development of the features started after 12th December for the first set, and the second set development ended on the 11th of May. The second survey started on the same day development finished. The survey finished on the fourth of February as all participants have completed the survey, the second set of people finished 12th of June. Data collection ended with a total of 19 lawyers.

3.9 Primary Data Description

Nineteen participants completed the survey. In this survey, three participants opened the survey questionnaire, and three participants finished all questions. Hence, three surveys were considered for final analysis. The average time to finish the pre-test survey is 10.29 minutes, the highest being 21 minutes. The average time to finish the post-test survey is 51.89 minutes, the highest being 2 hours. The average times are based on when the individual opens the survey to when they submit the survey.

3.10 Sampling

3.10.1 Sample method

Error! Reference source not found. is the information entered into a sample size calculator to find the ideal sample size. Population size is based on the law society database (*Get Legal Help*, 2021).

Population Size:	11,017
Confidence	90
Margin Error:	10
Ideal Sample size:	68

Table 10 Sample size determination for the survey

Note. Calculations are done using Qualtrics Sample Size Calculator (Qualtrics, 2021)

3.10.2 No of responses

Overall: 21 participants indicated they wished to be a participant.

Idle: 1 participant. They indicated they wanted to participate but did not do either survey.

Removed: 1 participant. Did not have the time to continue participating and indicated no longer being a participant and was removed from the survey.

Did one survey: 19 participants did the first survey (Pre-Test).

Reached the End: 17 participants did both surveys (Pre-Test and Post-Test). By the end, two participants did not participate in the post-test.

3.11 Data Analysis Method

To get a systematic understanding of responses in quantitative form, the researcher followed the below steps for data analysis. Steps for data analysis is based on the Zikmunds Business research methods book (Zikmund, 2013).

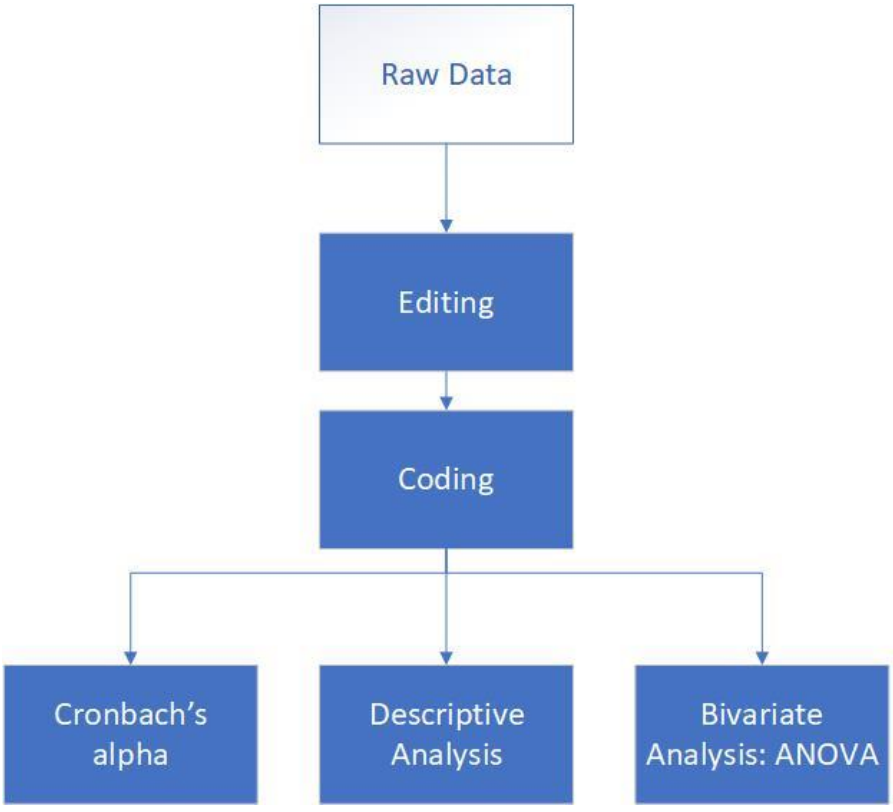

Figure 12 Overview of stages

3.11.1Raw Data

The raw data is gathered from Qualtrics. As all 27 survey questions are mandatory, all 13 pre-test survey questions were answered. However, two participants did not complete the post-test survey; only 17 respondents answered the post-test survey.

3.11.2 Editing

The only time data was edited is removing the one respondent who did not wish to participate anymore. Spelling mistakes from respondents answering survey questions are kept in the results.

3.11.3 Coding

The researcher used numeric codes, making the analysis result easier to analyse as some responses aren't precisely numerical. The data coding process is presented below:

Age range	Code
0-17	0
18-24	1
25-34	2
35-44	3
45-54	4
55-64	5
65-74	6
75+	7

Table 11 Age Coding

Response	Code
Yes	0
No	1

Table 12 Response Coding

Years of Retention range	Code
0	0
1-5	1
6-10	2
11-15	3

16-24	4
25-34	5
35-44	6
45+	7

Table 13 Years of Retention

Type of practice	Code
Law firm employee	1
Law firm partner	2
Sole practitioner	3
Sole Barrister	4
In house lawyer	5
Other	6

Table 14 Type of practice

Level of degree	Code
Bachelor	1
Post Grad	2
Law honours	3
Other	4

Table 15 Level of degree

Rating	Code
Excellent	1
Good	2
Bad	3
Terrible	4

Table 16 Rating Answer codes

3.11.4Descriptive Analysis

Descriptive analysis is collected in tabulation form, which helps display how frequently each response occurs (Zikmund, 2013). The data for this analysis is using Bar-Charts to show what are the most common response more visually. Results also come with bar charts based on

research questions that are Nominal, Interval and Ordinal measurements; however, research questions that have no Measurement/open-ended question are shown in a table and will not show the frequency. The results of the descriptive analysis are presented in Chapter 4.

3.11.5Univariate Analysis: Chi-square

The Chi-square test is the test for independence to categorical variables (Zikmund, 2013). Hence, the researcher used the Chi-square test for univariate analysis. A Chi-square test involving two nominal or ordinal variables are examined and find a p-value. A p-value determines whether the association between the two variables is statistically significant.

3.11.6 Bivariate Analysis: ANOVA

The researcher used two-way ANOVA (Analysis of Variance) to determine the interaction between two or more groups (Zikmund, 2013). Two-way means the test has two independent variables. The two variables for this research are age and type of practice. Variance tells you if there are any statistical differences between the means of three or more independent groups. This is done through p-value and Cramér's V. *p*-value is the probability value, or the observed or computed significance level, it must be lower than .05 (Zikmund, 2013). Cramér's V is the association between two variables and giving a value that is giving a value between 0 and 1 (Cramér, 1999).

3.12 Conclusion

To summarise the research following the Postpositivism worldview, it similarly follows the researchers' beliefs and how they want to conduct the research. The researcher uses pre-test and post-test as it is one way that allows the researcher to conduct experiments with research participants. Data is analysed using Cronbach's alpha, ANOVA, and descriptive analysis.

4.0 Results

This chapter details the results of the surveys. Out of the two hundred fifty firms and people the researcher tried to contact, only 19 people responded. This number of responses is due to firms not having people with the available time to do the survey and can only spare one person. This section also shows the result of descriptive analysis, Chi-square, and ANOVA test results.

4.1 Data Analysis

The researcher presented a descriptive analysis using a frequency distribution table for each survey question. Using the information in the frequency distribution table, bar charts were presented for each survey question showing the response data for a particular question. Interpretations of the results have been stated using the frequency tables and bar charts. The frequency table and bar chart for each question is shown below

4.1.1 Descriptive analysis

Descriptive analysis is a summary statistic that quantitatively summarises features from a collection of information. The researcher presented a descriptive analysis using a frequency distribution table for each survey question. Using the information in the frequency distribution table, bar charts were presented for each survey question showing the response data for a particular question. Interpretations of the results have been stated using the frequency tables and bar charts. The frequency table and bar chart for each question is shown below.

4.1.1.1 Pre-test

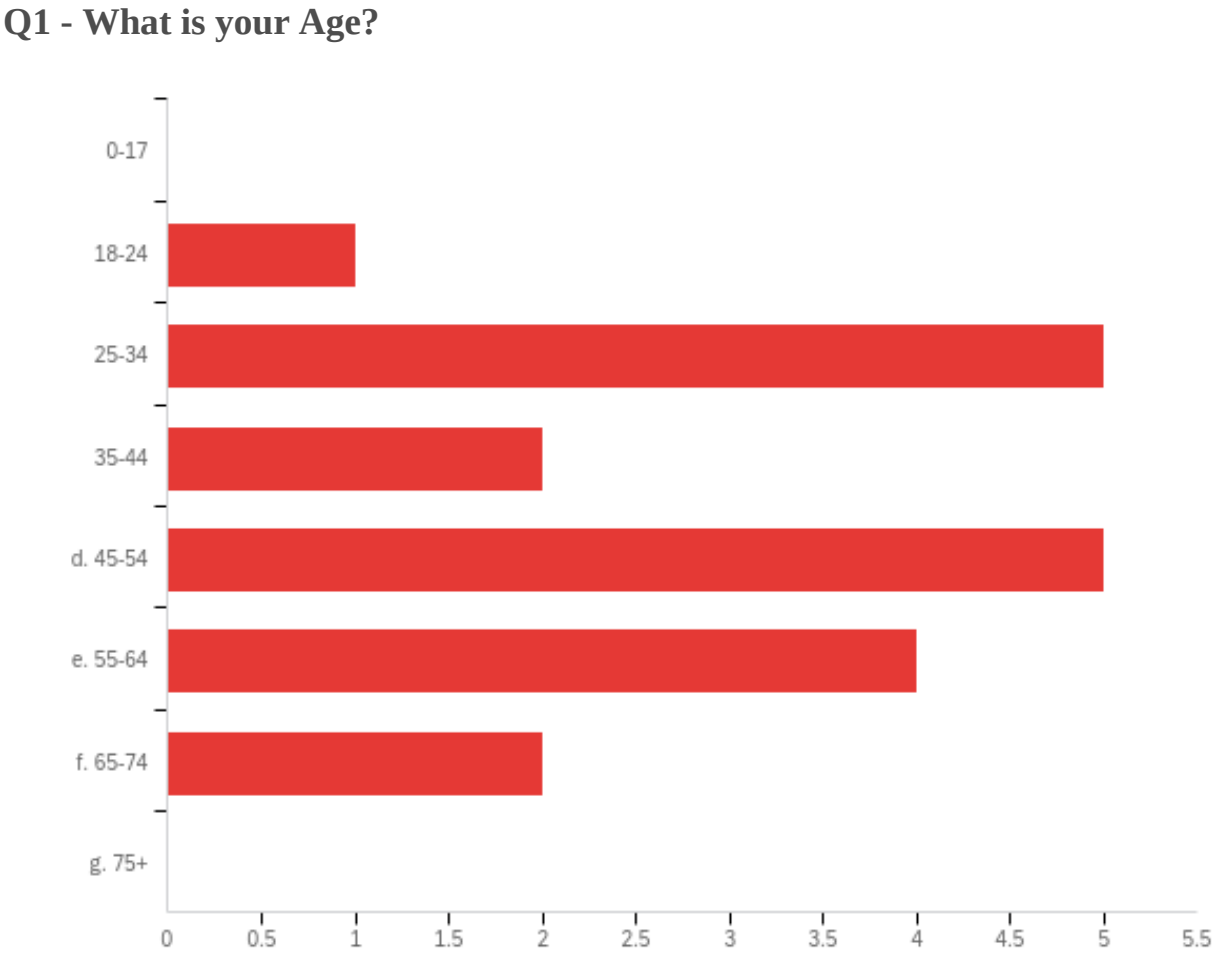

Figure 13 Bar graph of participants grouped by age groups

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What is your Age?	2.00	7.00	4.63	1.46	2.13	19

Table 17 Average value of a distribution

#	Answer	%	Count
1	1-17	0.00%	0
2	18-24	5.26%	1
3	25-34	26.32%	5

4	35-44	10.53%	2
5	d. 45-54	26.32%	5
6	e. 55-64	21.05%	4
7	f. 65-74	10.53%	2
8	g. 75+	0.00%	0
	Total	100%	19

Table 18 Description of respondents with different age groups

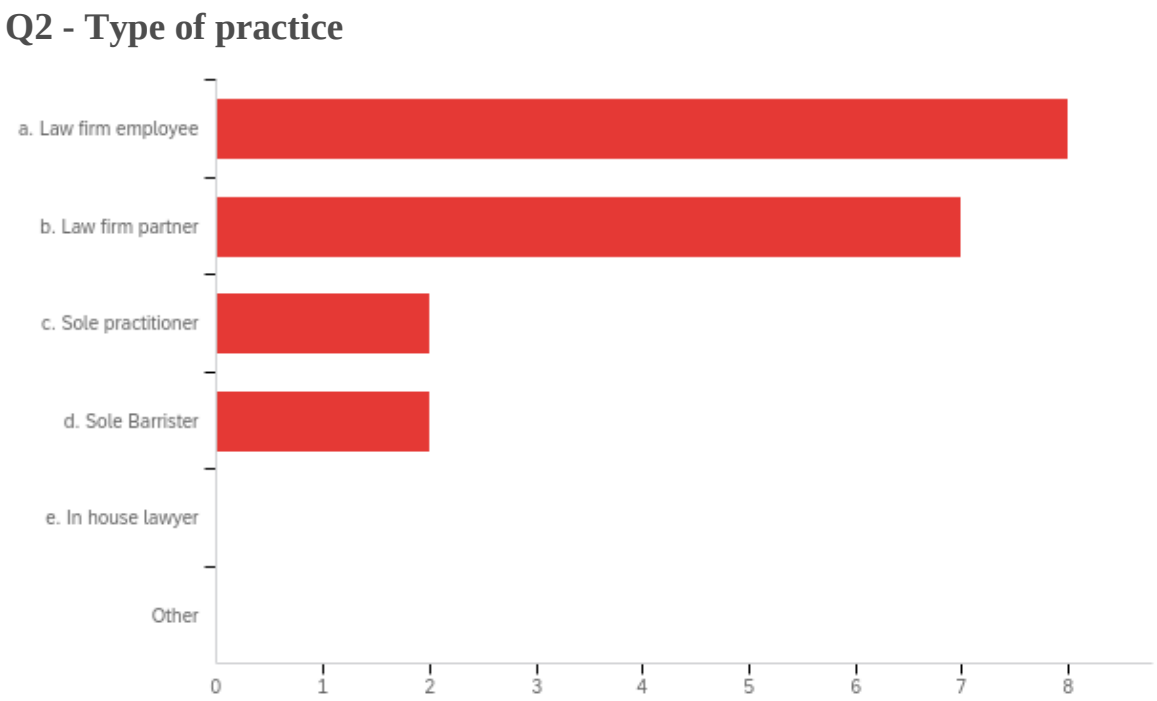

Figure 14 Bar graph of participants grouped by type of practice

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Type of practice	1.00	4.00	1.89	0.97	0.94	19

Table 19 Average value of a distribution

#	Answer	%	Count
1	a. Law firm employee	42.11%	8
2	b. Law firm partner	36.84%	7
3	c. Sole practitioner	10.53%	2
4	d. Sole Barrister	10.53%	2
5	e. In house lawyer	0.00%	0
6	Other	0.00%	0
	Total	100%	19

Table 20 Description of the participants grouped by their type of practice

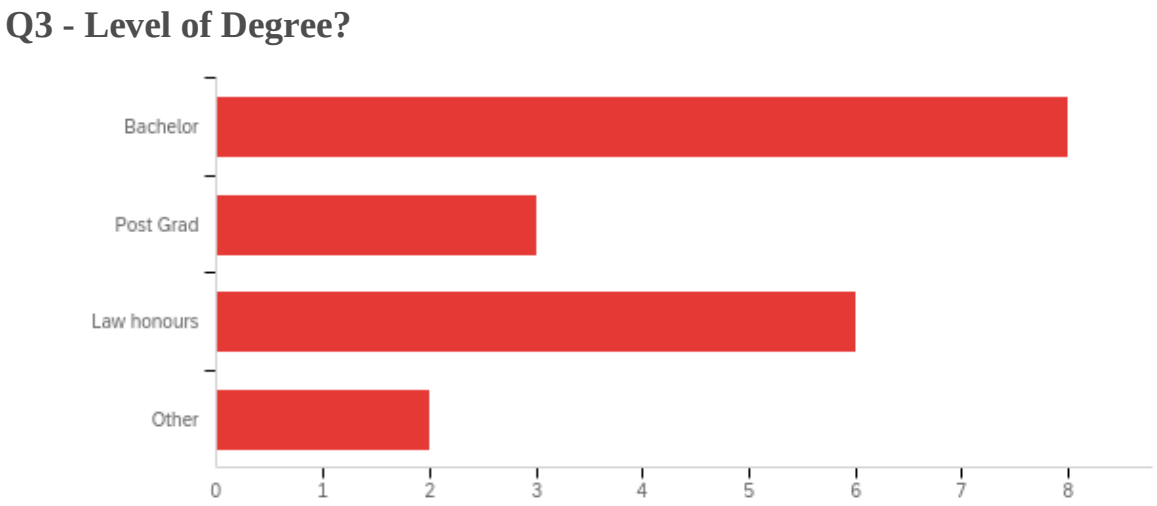

Figure 15 Bar graph of participants grouped by level of degree

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Level of Degree?	1.00	4.00	2.11	1.07	1.15	19

Table 21 Average value of a distribution

#	Answer	%	Count
1	Bachelor	42.11%	8
2	Post Grad	15.79%	3
3	Law honours	31.58%	6
4	Other	10.53%	2
	Total	100%	19

Table 22 Description of the participants grouped by their level of degree

Q3.5 - What is the other?

What is the other?
Legal Executive
NZ Institute of Legal Executive Diploma

Q4 - Years of Retention/Practice?

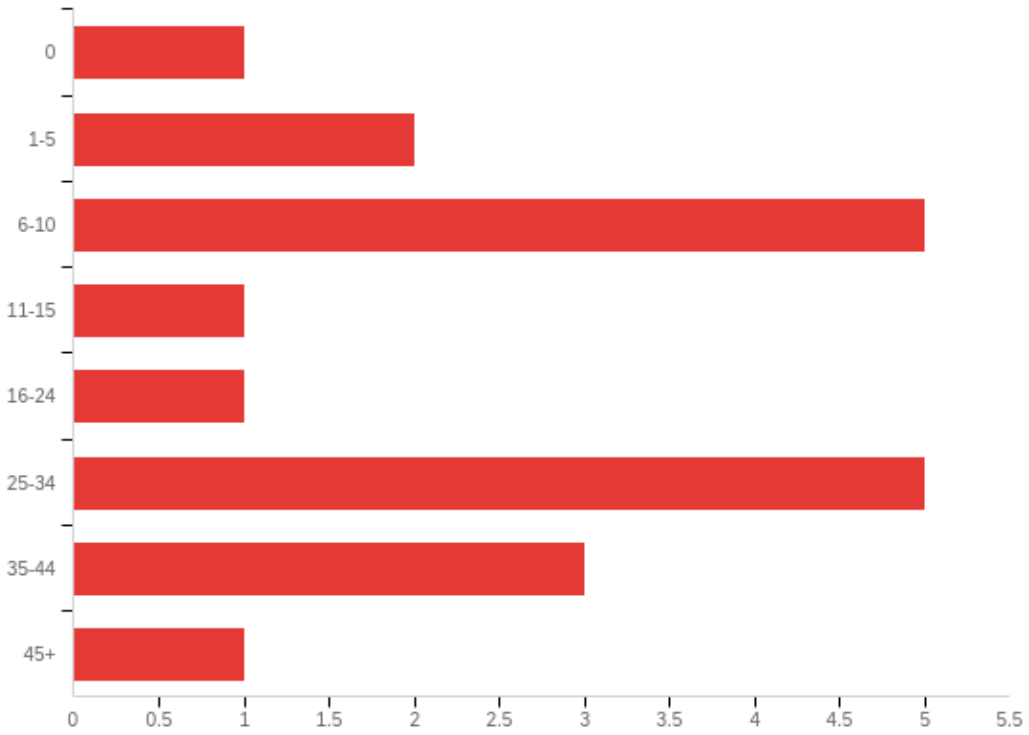

Figure 16 Bar graph of participants grouped by years of practice

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Years of Retention/Practice?	1.00	8.00	4.63	2.03	4.13	19

Table 23 Average value of a distribution

#	Answer	%	Count
1	0	5.26%	1
2	1-5	10.53%	2
3	6-10	26.32%	5
4	11-15	5.26%	1
5	16-24	5.26%	1
6	25-34	26.32%	5
7	35-44	15.79%	3
8	45+	5.26%	1
	Total	100%	19

Table 24 Description of the participant in years of practice

Q5 - Have you used software to assist you with your work before?

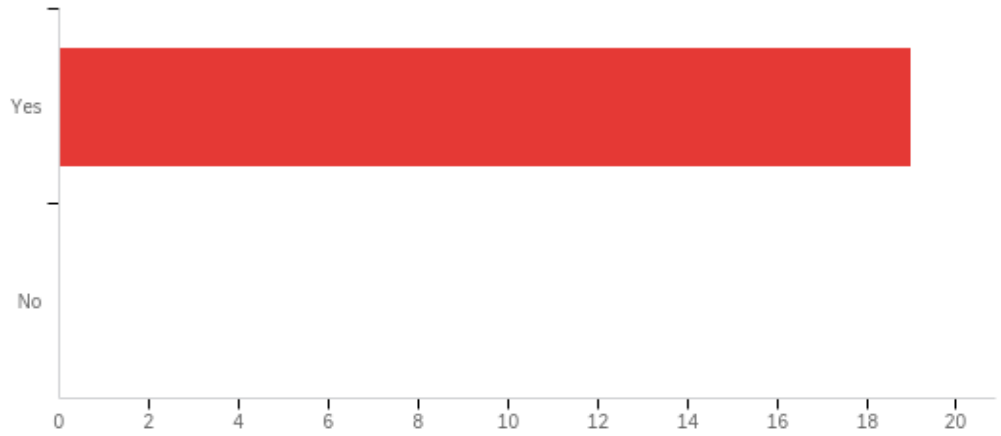

Figure 17 Bar graph of participants grouped by if they have used similar technology

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Have you used software to assist you with your work before?	1.00	1.00	1.00	0.00	0.00	19

Table 25 Average value of a distribution

#	Answer	%	Count
1	Yes	100.00%	19
2	No	0.00%	0
	Total	100%	19

Table 26 Description of the participant in believing they have used similar technology

Q6 - Why did you like it? Microsoft office - Office suite LexisNexis - Legal Research Xero - Accounting Nextcloud - Cloud Storage If you are unsure of the application you can say 'I use an application to manage invoices'

Why did you like it? Microsoft office - Office suite LexisNexis - Legal Research Xero - Accounting Nextcloud - Cloud Storage If you are unsure of the application you can say 'I use an application to manage invoices'
Microsoft Office - helps me manage reminders, work load, personal tasks and appointments and notes pertaining to files, clients, potential work or appointments.
Mostly just use Microsoft Office software for day to day work. Easy to use and gets the job done. I have a preference for Westlaw over LexisNexis, since I don't want a lot of bells and whistle, just the cases and a good search function.
Ability to use it anywhere via internet
Not sure what this question means
I use Microsoft Office daily to create Legal Aid Invoices and Letters etc and I like it because it is easy to use and functional
Cloud storage enables me to access my documents from anywhere. This is a huge advantage.
use Office all the time in my work
unsure
I use outlook for managing court hearing dates and appointments
I neither like nor dislike Office - it's just the standard that everyone uses. I don't really like LexisNexis - I find the user experience non-intuituve.
Lexis Nexis, unsure of others and I just use a template to write invoices
More consistently ensuring accuracy and efficiency
Accuracy and speed
Streamlines tasks
Using technologies increases speed and efficiencies of various work tasks
LawFlow (an e-discovery system) because it holds all discovery documents in one place
Efficient
It has templates ready made to use

Q7 - How did it feel getting day to day work done?

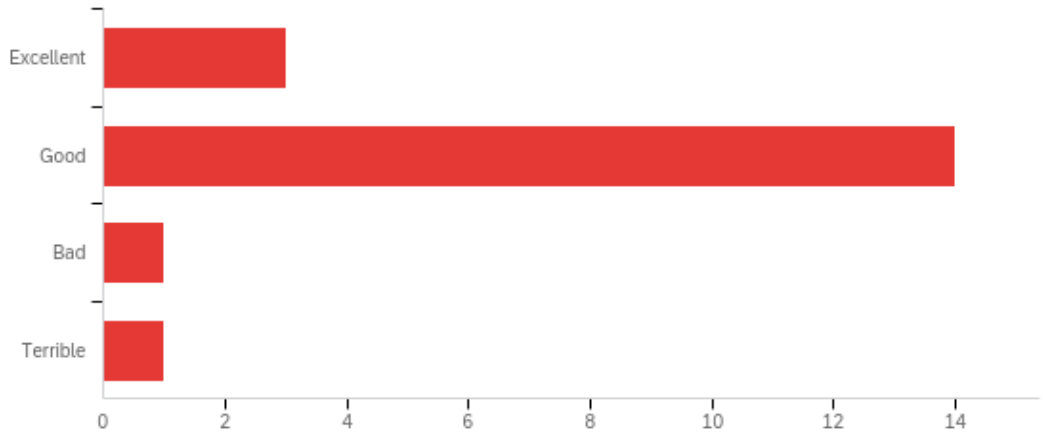

Figure 18 Bar graph of participants grouped by getting day to day work done

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	How did it feel getting day to day work done?	1.00	4.00	2.00	0.65	0.42	19

Table 27 Average value of a distribution

#	Answer	%	Count
1	Excellent	15.79%	3
2	Good	73.68%	14
3	Bad	5.26%	1
4	Terrible	5.26%	1
	Total	100%	19

Table 28 Description of the participant in getting day to day work done

Q8 - What do you think of the process of getting day to day work done? Ideas you can talk about: The process of getting a task done. The process of reviewing information created The process of using a feature Did you like using it, did you not?

What do you think of the process of getting day to day work done? Ideas you can talk about: The process of getting a task done. The process of reviewing information created The process of using a feature Did you like using it, did you not?
Application useful to get work done and schedule work load and meeting and reminders of key dates/tasks.
This question is not clear to me. But I frankly have no concerns about my current work processes.
often fills me with dread...but the ability to work out of the office is great as is the level of automation which speeds up laborious tasks
can be time consuming
Microsoft Office makes it easy to get tasks done, once the application is open I am able to use macros which bring up templates required for my job. When I want to review information they have a review section I use to make notes against my work etc. I like using it as it is not overcomplicated.
Windows 10 is awful.
I feel a lot of things in teh office are repeated over and over gaian which could be standardised
Our office software systems are good but often hit tec prolems with system stability as we use a thin client system.
The process of getting a task done.
I like having information readily available and easily accessible
I just want technology to work, and be easy to use with minimal training
I am not quite sure what you are asking. I will talk about Lexis Nexis. To be fair I still find it trial and area. Mostly I use the search in publications functions. I cross fingers when I use it. What is difficult is finding corroboration for information in NZ law (written by practitioners). It is reader friendly but I do not 100% trust it.
get to the task easily and respond quickly
Not keeping up with technological changes
Tech works pretty well to make tasks more efficient
technologies I use help to create and store information more quickly and efficiently
the process of reviewing and marking the information as required in the discovery process is simple and helpful in getting the work done
Easy to search client info, documents,

It provides an easy access to legal templates and case studies

Q9 - What are the issues are you facing currently? Examples: To slow Wrong information

What are the issues are you facing currently? Examples: To slow Wrong information
Information incomplete or not available or irrelevant
Office software can get a little too slow once you reach a critical mass of information. But otherwise no issues.
Clients not supplying information in a timely manner that is correct
slow
The system can lag and drop the macros occasionally.
It is not always possible to get urgent technical help.
to slow
tthe main barrier is I do not touch type so rely on offsite dictation for more involved documents.
to slow
Methods of inputting information into the software and keeping information up to date is difficult at times
Too slow. Useful information is often spread across different platforms.
wrong information
before technology introduced both too slow and often information was incorrect. Can check and cross reference to find accurate info
Accessibility
Scheduling work around other committments
No issues, technologies are very good
search filters not accurate enough
Slow
I think the platform could be more user friendly

Q10 - What was your experience getting day to day tasks done?

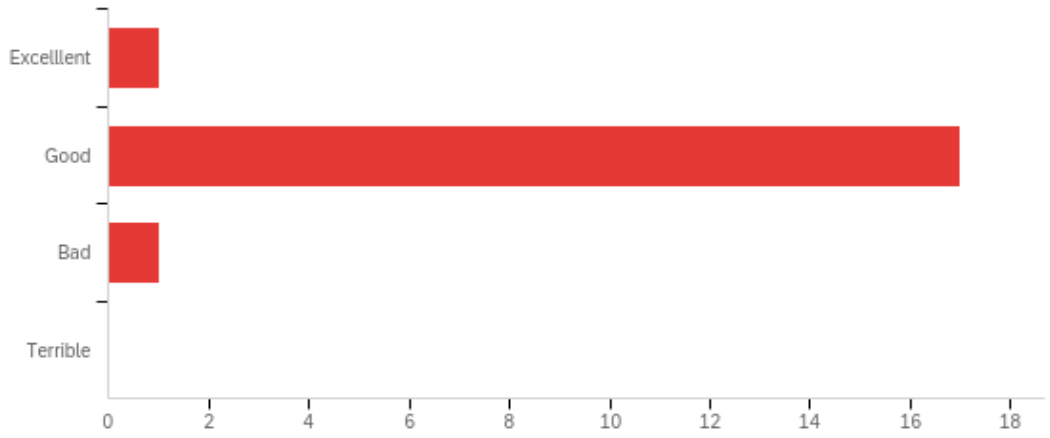

Figure 19 Bar graph of participants grouped by their experience getting day to day tasks done

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What was your experience getting day to day tasks done?	1.00	3.00	2.00	0.32	0.11	19

Table 29 Average value of a distribution

#	Answer	%	Count
1	Excellent	5.26%	1
2	Good	89.47%	17
3	Bad	5.26%	1
4	Terrible	0.00%	0
	Total	100%	19

Table 30 Description of the participant in getting day to day tasks done

Q11 - What do you think of using a machine providing you with information?

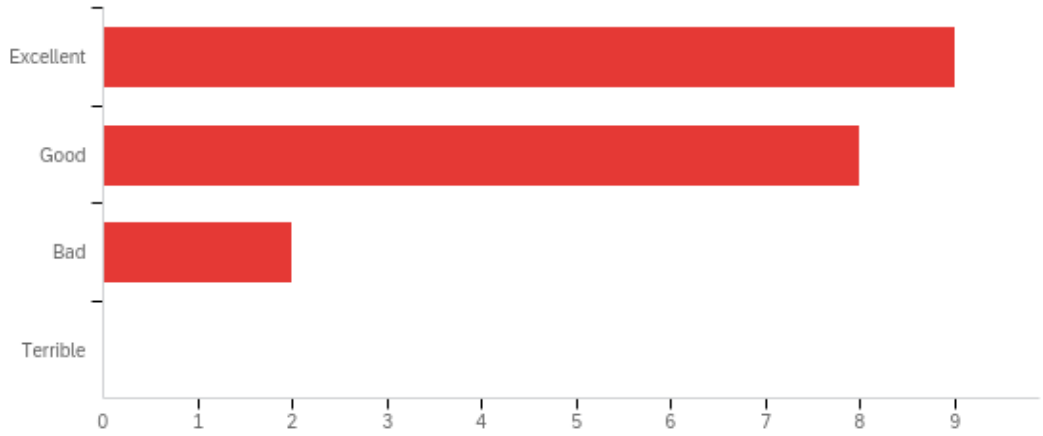

Figure 20 Bar graph of participants grouped by how comfortable they are with providing a machine with information

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What do you think of using a machine providing you with information?	1.00	3.00	1.63	0.67	0.44	19

Table 31 Average value of a distribution

#	Answer	%	Count
1	Excellent	47.37%	9
2	Good	42.11%	8
3	Bad	10.53%	2
4	Terrible	0.00%	0
	Total	100%	19

Table 32 Description of the participant in providing a machine with information

Q12 - How did you feel about the information you find on your own?

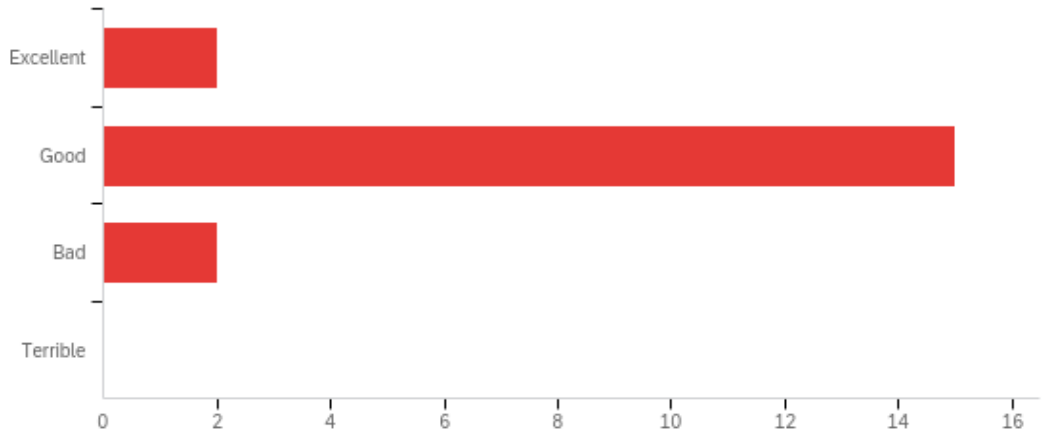

Figure 21 Bar graph of participants grouped by how they feel about finding information on their own

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	How did you feel about the information you find on your own?	1.00	3.00	2.00	0.46	0.21	19

Table 33 Average value of a distribution

#	Answer	%	Count
1	Excellent	10.53%	2
2	Good	78.95%	15
3	Bad	10.53%	2
4	Terrible	0.00%	0
	Total	100%	19

Table 34 Description of the participant in finding information on their own

Q13 - If an software application built for you, what do you think should be added to the application? Examples: Automating tasks More Insights Templates Helping with a problem you have

If an software application built for you, what do you think should be added to the application? Examples: Automating tasks More Insights Templates Helping with a problem you have
templates
more automation - especially in controlling workflow.
ease of accessing legal templates,office precedents,the statutes and regulations,and key articles and opinions on the topic in question
better search filters
automation, AI suggestions and templates
automated tasks. templates and insights
all of the above
Updated templates i.e. with the new Trusts Act
Templates, speed, automation
Templates, easier search engine
Templates that can be uploaded into it would make work more efficient. I personally don't feel enough time restraints to justify automation, or the risk-management time that would be spent in ensuring the automation didn't cause any issues.
Templates in system whcih are consistent with outher firms
Prepopulating information, useful templates and links to sources of, or articles with, useful information
I do not have any application built for me. Badly-framed question.
Don't really follow the question - I was aksed about technologies earlier - I use multiple technologies eg time recording, online law libraries, etc
Automating tasks, and putting time aside to accomplish set tasks
All of the above. I need a google like search key. Putting a short sentence in. I cannot do "..."x6 etc. I forget or an error puts the whole search off. Keywords I use often to be saved and recognised and even my way of asking questions to be recognised. I probably need a little legal robot friend! It is about plain English 'all information on medical incapacity cases'
All of the above
A workflow management tool

13.1.1.1 Post-Test

Q1 - What is your Age?

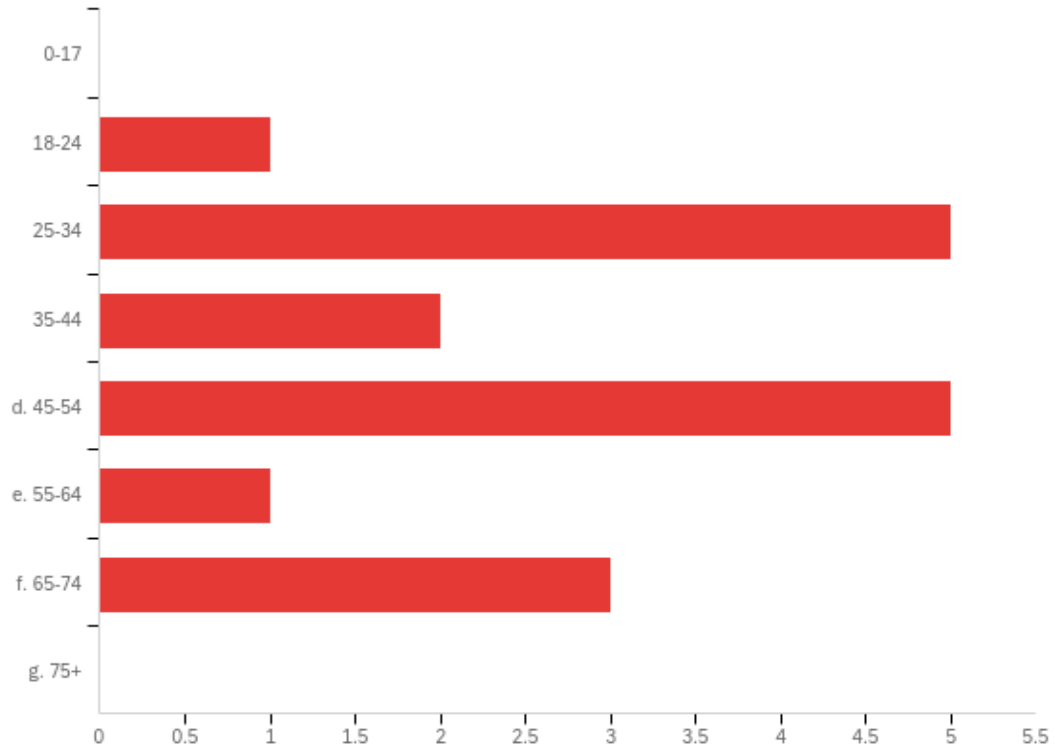

Figure 22 Bar graph of participants grouped by their age range

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What is your Age?	2.00	7.00	4.53	1.54	2.37	17

Table 35 Average value of a distribution

#	Answer	%	Count
1	0-17	0.00%	0
2	18-24	5.88%	1
3	25-34	29.41%	5
4	35-44	11.76%	2
5	d. 45-54	29.41%	5
6	e. 55-64	5.88%	1
7	f. 65-74	17.65%	3
8	g. 75+	0.00%	0
	Total	100%	17

Table 36 Description of the participant's age range

Q2 - Type of practice

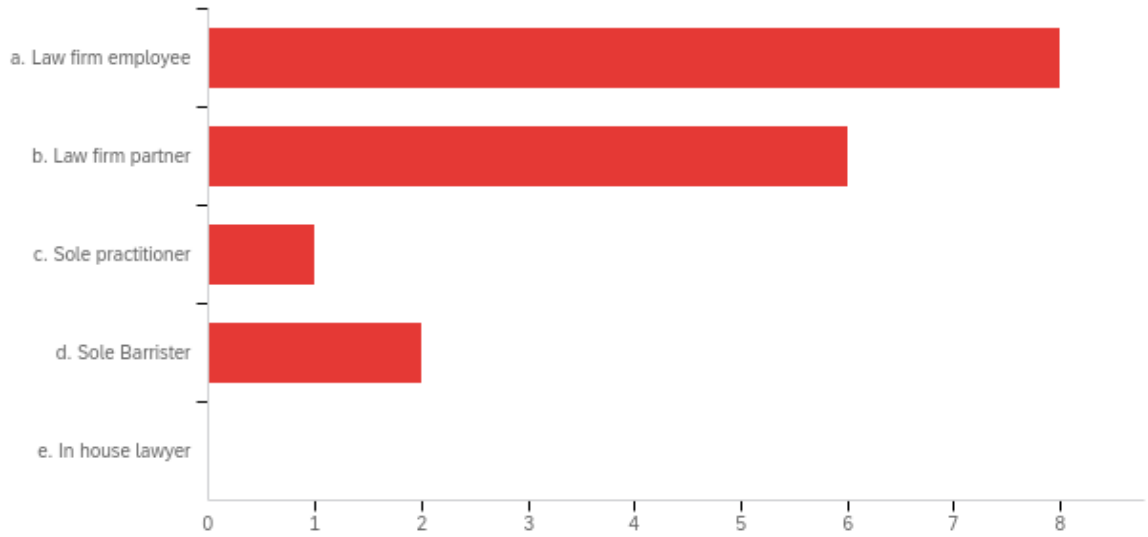

Figure 23 Bar graph of participants grouped by their type of practice

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Type of practice	1.00	4.00	1.82	0.98	0.97	17

Table 37 Average value of a distribution

#	Answer	%	Count
1	a. Law firm employee	47.06%	8
2	b. Law firm partner	35.29%	6
3	c. Sole practitioner	5.88%	1
4	d. Sole Barrister	11.76%	2
5	e. In house lawyer	0.00%	0
	Total	100%	17

Table 38 Description of the participants in the type of practice

Q3 - Level of Degree?

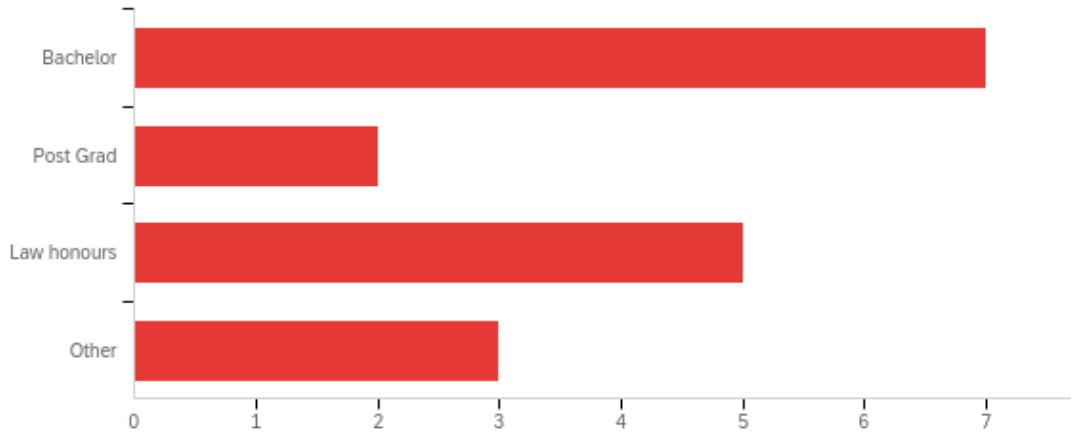

Figure 24 Bar graph of participants grouped by their level of degree

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Level of Degree?	1.00	4.00	2.24	1.16	1.36	17

Table 39 Average value of a distribution

#	Answer	%	Count
1	Bachelor	41.18%	7
2	Post Grad	11.76%	2
3	Law honours	29.41%	5
4	Other	17.65%	3
	Total	100%	17

Table 40 Description of the participant in the level of degree

Q4 - Years of Retention/Practice?

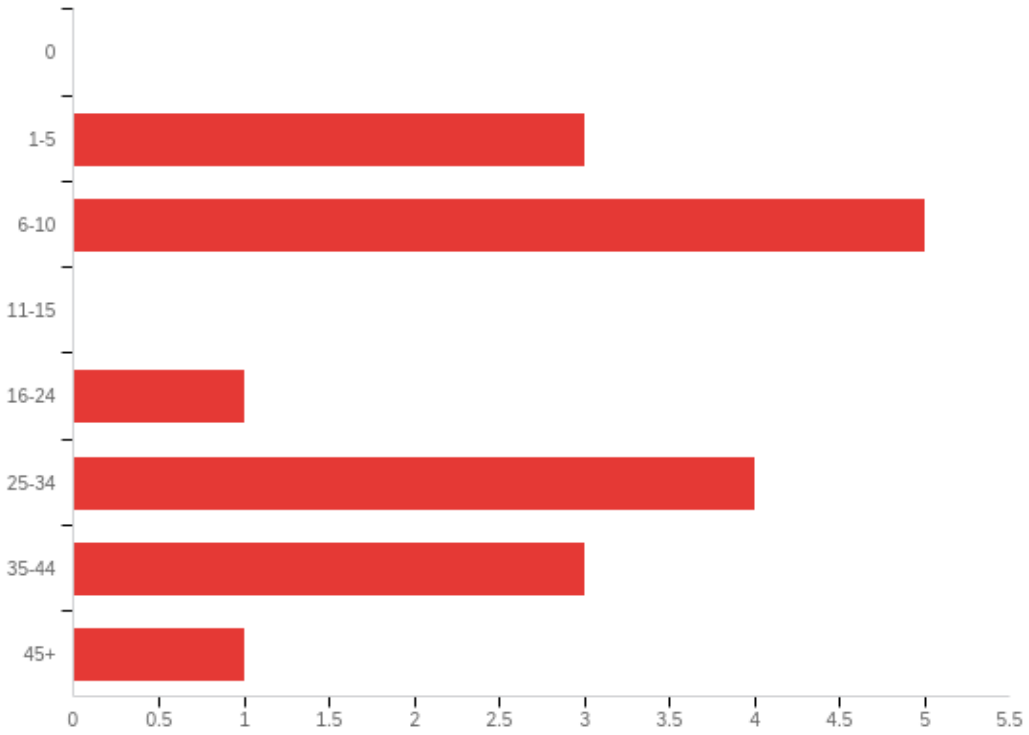

Figure 25 Bar graph of participants grouped by their years of practice

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Years of Retention/Practice?	2.00	8.00	4.65	2.03	4.11	17

Table 41 Average value of a distribution

#	Answer	%	Count
1	0	0.00%	0
2	1-5	17.65%	3
3	6-10	29.41%	5
4	11-15	0.00%	0
5	16-24	5.88%	1
6	25-34	23.53%	4
7	35-44	17.65%	3
8	45+	5.88%	1
	Total	100%	17

Table 42 Description of the participant in years of practice

Q5 - Have you used other similar technologies/applications before? Like: Organising items Searching for items Text analytics similar sites like the one given to you

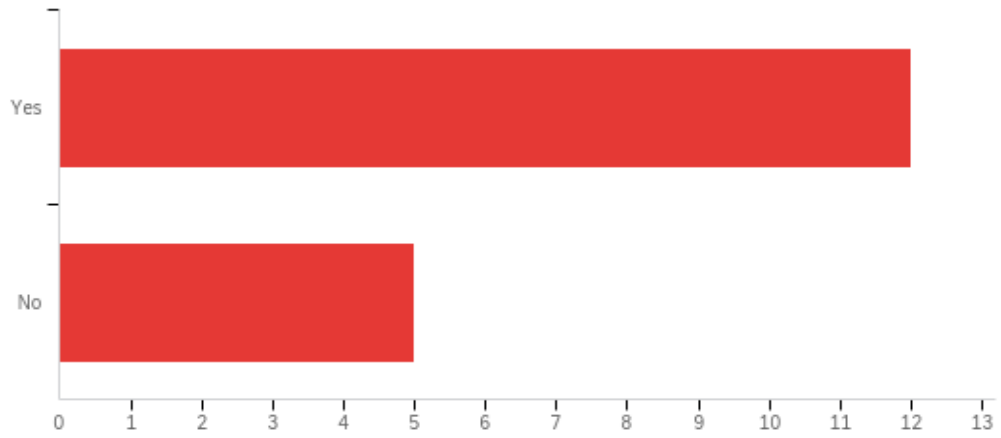

Figure 26 Bar graph of participants grouped by their belief in using similar technologies before

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Have you used other similar technologies/applications before? Like: Organising items Searching for items Text analytics similar sites like the one given to you	1.00	2.00	1.29	0.46	0.21	17

Table 43 Average value of a distribution

#	Answer	%	Count
1	Yes	70.59%	12
2	No	29.41%	5
	Total	100%	17

Table 44 Description of the participant in using similar technologies

Q6 - What was that application and why you liked it?

What was that application and why you liked it?
Affinity Thompson Reuters
other application did part of what is being done here. I enjoyed the focussed access but not so much file focussed info was in one place though
alexnz.tech, It was easy to find your way around and figure it out. The idea of the templates and decisions is great, functionality, not so much. I think a filter would make it much easier to get around, as the list of decisions would take time to get through. The idea that you can upload these things to your own dashboard is great for when submissions are being written and you want to keep case law.
Infinity Law
First to File
Inprotech, Outlook, others
First to File provides some similar features. Outlook for calendar/meetings. Word for templates. All of them are nice and simple to use.
action step
lawbase, ferret
Xero
Infinity/Workflow
Lexis Nexis

Q7 - How did it feel to use this website?

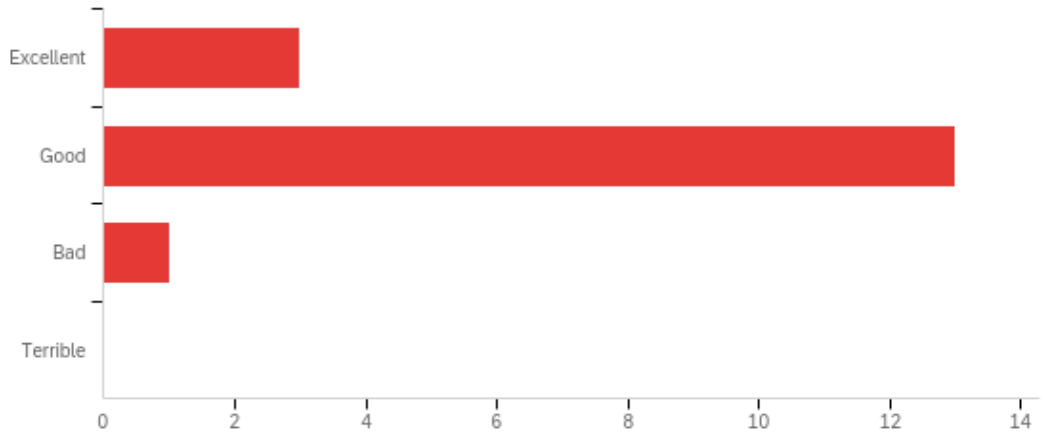

Figure 27 Bar graph of participants grouped by their feel to use the website

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	How did it feel to use this website?	1.00	3.00	1.88	0.47	0.22	17

Table 45 Average value of a distribution

#	Answer	%	Count
1	Excellent	17.65%	3
2	Good	76.47%	13
3	Bad	5.88%	1
4	Terrible	0.00%	0
	Total	100%	17

Table 46 Description of the participant in feel to use the website

Q8 - What do you think of the process of using the website? Ideas you can talk about: The process of getting a task done. The process of reviewing information created The process of using a feature Did you like using it, did you not?

What do you think of the process of using the website? Ideas you can talk about: The process of getting a task done. The process of reviewing information created The process of using a feature Did you like using it, did you not?
It is useful so long as everyone is committed to always using it properly (ie: committed to using it, committed to completing the information correctly, committed to the same standard of information etc) so any transition needed between staff members is smooth and straight-forward.
Neutral
if we are talking about the Affinity application it is an efficient business tool. If talking about your site I didnt really get to play with it
To be honest the basic platform I went into did not encourage me to play. It would help if I was given the process to get a task completed. I guess as something to you on track you can set your own process as a guide at the beginning
Yes it quickened getting the basic task done. The information was easy to access and follow.At file level you knew where you were around invoices etc. There was an easy access store of information ready for the next case along similar lines in the same area of law
It is easy to use, anybody would be able to figure it out, visually not too appealing. As mentioned before the templates and decision sections are great but need a filtering selection for a user to quickly find what they need. Personally the calendar is not something that would flow with me as my calendar is linked with my emails and that makes meetings etc easier to work with. Invoices in theory would be great to keep track of but as we work in a firm somebody else deals with billing and invoices. I think this would be a great system for sole barristers.
Helpful
Clear records and to do lists
This question is too vague to meaningfully answer
Visually appealing and easy to navigate
Having the ability to cover various processes (meetings, case notes, etc) all in one place is a real benefit in saving time. It also seems easy to move between various tasks.
it was great when opening files
No I do not
ease of use and speed is very good
The processes of adding/editing within the site are simple and easy to use. The requirement to enter each to do item independately rather than having it integrated with email would result in additional work.
Seems tidy and easy to follow, however given the size of my firm we use a feature designed for our exact purposes

I like the idea of having a database for each individual client with quick access to relevant cases and templates etc. I can see, with some modifications it would be a useful tool for law practitioners.

Q9 - Did you have any issues using the website? Examples: Inaccuracies Missing information

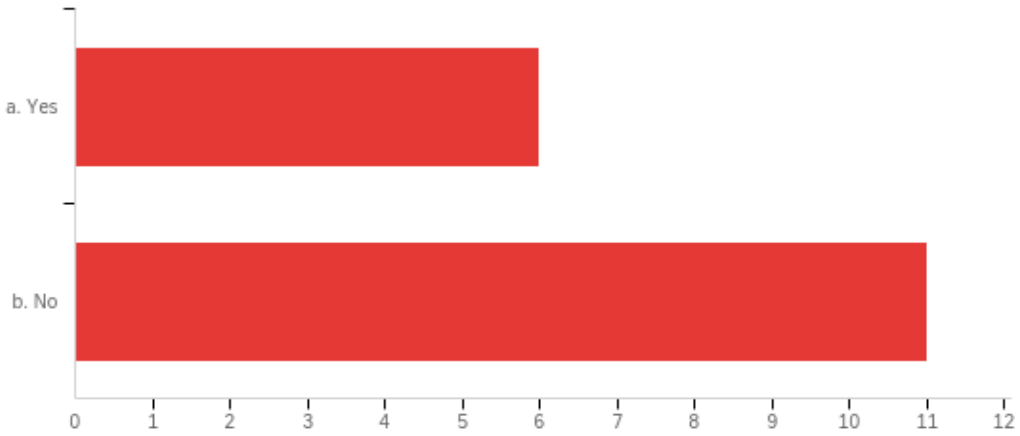

Figure 28 Bar graph of participants grouped by their issues using the site

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Did you have any issues using the website? Examples: Inaccuracies Missing information	1.00	2.00	1.65	0.48	0.23	17

Table 47 Average value of a distribution

#	Answer	%	Count
1	a. Yes	35.29%	6
2	b. No	64.71%	11
	Total	100%	17

Table 48 Description of the participant's issues using the site

Q10 - What are the issues you have had using the website? Examples: To slow Wrong information Graphical glitches

What are the issues you have had using the website? Examples: To slow Wrong information Graphical glitches
no
My main issue is with how decisions have been formatted and provided to the user. It's not a particularly readable form, and when reading long cases, readability is key. As it currently is, I would not use the Decisions tab at all and instead prefer to continue to read cases in other ways.
wrong information and took so long to change it
wrong information, information not being linked
the old adage 'garbage in garbage out' still applies - lack of or bad bas info will cause trouble
I couldn't see any actual cases that were referred to i.e. when I clicked on the Cases icon it didn't bring the case up to review. Also, when I added a new item into an invoice and tried to print it returned a message "The server returned a "500 Internal Server Error".

Q11 - What was your experience like learning this website?

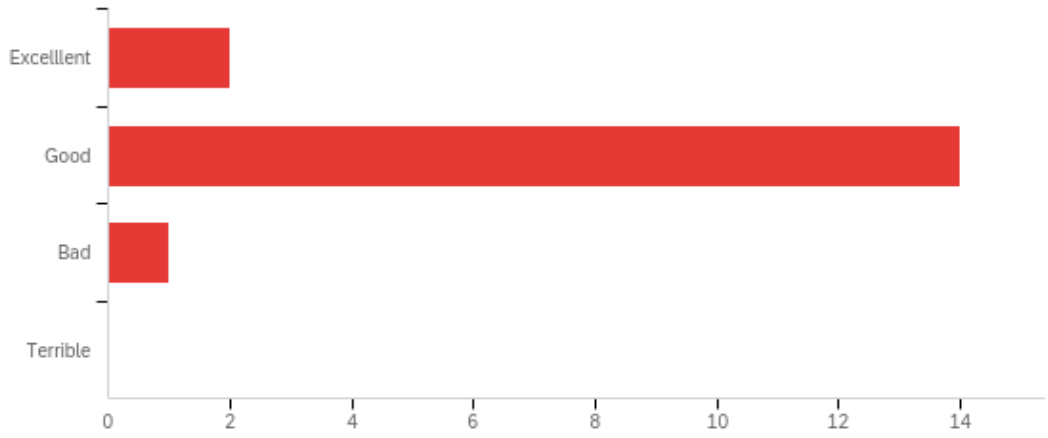

Figure 29 Bar graph of participants grouped by their experience learning the website

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What was your experience like learning this website?	1.00	3.00	1.94	0.42	0.17	17

Table 49 Average value of a distribution

#	Answer	%	Count
1	Excellent	11.76%	2
2	Good	82.35%	14
3	Bad	5.88%	1
4	Terrible	0.00%	0
	Total	100%	17

Table 50 Description of the participant in experience learning the website

Q12 - What do you think of using a machine providing you with information?

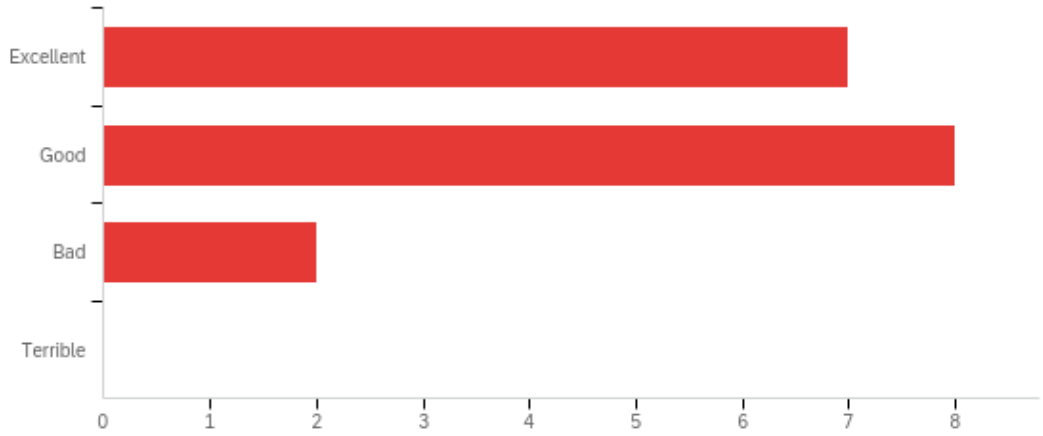

Figure 30 Bar graph of participants grouped by how comfortable they are with providing a machine with information

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What do you think of using a machine providing you with information?	1.00	3.00	1.71	0.67	0.44	17

Table 51 Average value of a distribution

#	Answer	%	Count
1	Excellent	41.18%	7
2	Good	47.06%	8
3	Bad	11.76%	2
4	Terrible	0.00%	0
	Total	100%	17

Table 52 Description of the participant in being comfortable with providing information to technology

Q13 - How did you feel the information the application gave?

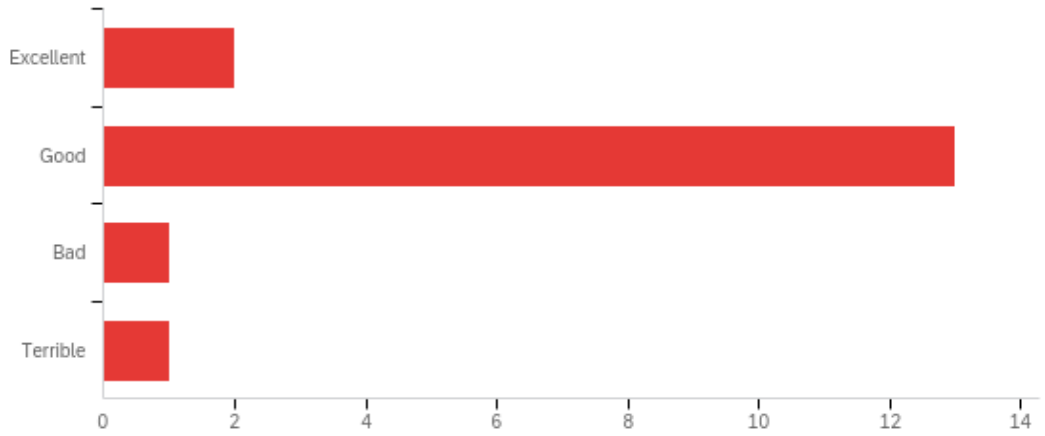

Figure 31 Bar graph of participants grouped by how they felt for the information the application gave

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	How did you feel the information the application gave?	1.00	4.00	2.06	0.64	0.41	17

Table 53 Average value of a distribution

#	Answer	%	Count
1	Excellent	11.76%	2
2	Good	76.47%	13
3	Bad	5.88%	1
4	Terrible	5.88%	1
	Total	100%	17

Table 54 Description of the participant in the feel for the information given

Q14 - What do you think should be added to the application? Examples: More Insights Templates Helping with a problem you have

What do you think should be added to the application? Examples: More Insights Templates Helping with a problem you have
More templates. Contacts. Useful websites.
A better understanding of the work I do, by the programmer
no real ideas
All of the above. Easy search tools. No matter how hard I try Lexis Nexis is difficult to get information from easily. It usually takes you to Laws of New Zealand. Templates are always welcome. There are a lot of areas of law. For example teachers disciplinary action - when do make an application for interim suppression of name. I am doing that at the moment and I can not find the process anywhere! Helping with a problem I have would eb great. Lawyers LOVE templates. On the statement of claim I would say Background of facts. To many lawyers put evidence into Statements of claim. They can only do that if they list it under 'Particulars of Claim'. Things like that. ts
perhaps roadblocks and key issues which needed special attention in a particular case. However that is not so relevant overall. Each case turns on its own facts. Perhaps special aspects of the law around the case would and could be an ongoing additional focus
More templates etc and a filtering option, make it easy and time saving for the client as they want to find examples without having to click into each document.
1. link to email inbox. 2. cases search isn't really that useful as will be very fact dependent maybe instead have....3. a useful links section e.g. family law- link to Family Court website, often used family law textbooks and cases etc 4. A way to reorder and reprioritise tasks e.g. colour coding etc.5. could calender section look like a work week rather than just a long list e.g. MOnday to Friday and be able to see hours of the day 6. delegated tasks section eg. sent this letter to PA to type on Wednesday need back Friday type functionality, 6. easy view of how much of budget has been reached per month e.g. you are 50% toyour budget this month, 7. time recording function
Follow up lists and calendar intergration
This application is nowhere near sophisicated enough to be of much use.
Filenotes
If there was a more robust search function for decisions it would be a real benefit, I think. I tried to search and it just sent me back to the "home page" so to speak.
it looks okay
more insights, templates
more insights
Within case files, the ability to add a folder to distinguish between the different types of documents that would be uploaded. To be anble to reorder the case files in order of most recently used or most often used.
Templates would be useful,

I think some modifications could be made to enhance the platform. A raft of templates should be included to cover the many realms of law i.e. Trust, conveyancing, Bankruptcy, Elder Law etc. Perhaps an icon to search on a particular word to find the template required. I'm not sure how you are supposed to create the document in the Dashboard field i.e. how do you link the template document to be created?

4.2.3 Chi-square

4.2.3.1 Pre-Test

4.2.3.1.1 Age

There is a strong statistically significant relationship between Q1: What is your Age? and Q4: Years of Retention/Practice?

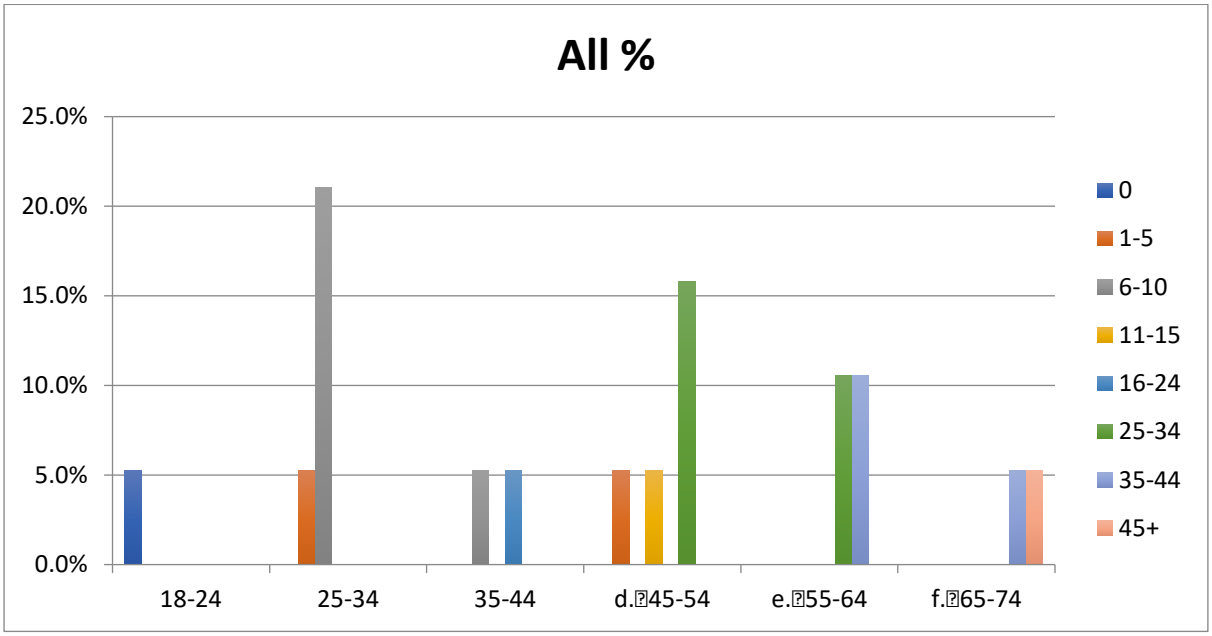

Figure 32 Percentage of participants were of the same age and same years of retention/practice?

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Very clearly significant	0.004401
Effect Size (Cramér's V)	Large	0.8
Sample Size		19

Table 55 Chi-Square Test

There is no statistically significant relationship between Q1: What is your Age? and Q3: Level of Degree?

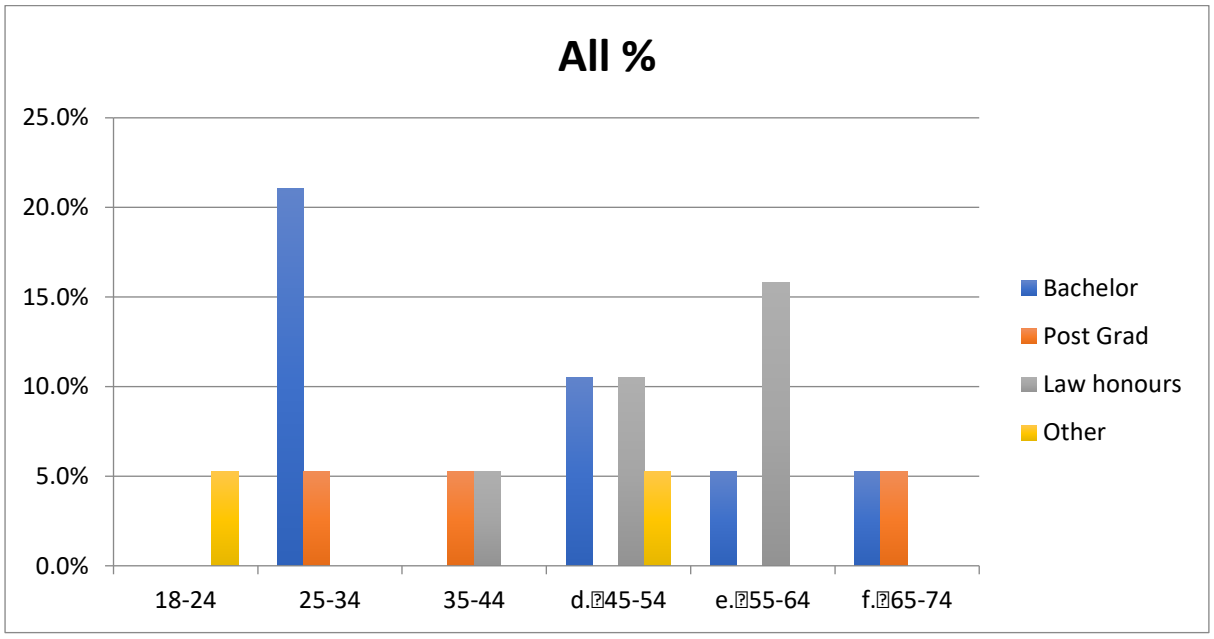

Figure 33 Percentage of participants were of the same age and same level of degree

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not quite significant	0.094808
Effect Size (Cramér's V)	Large	0.628601
Sample Size		19

Table 56 Chi-Square Test

There is no statistically significant relationship between Q1: What is your Age? and Q10: What was your experience getting day to day tasks done?

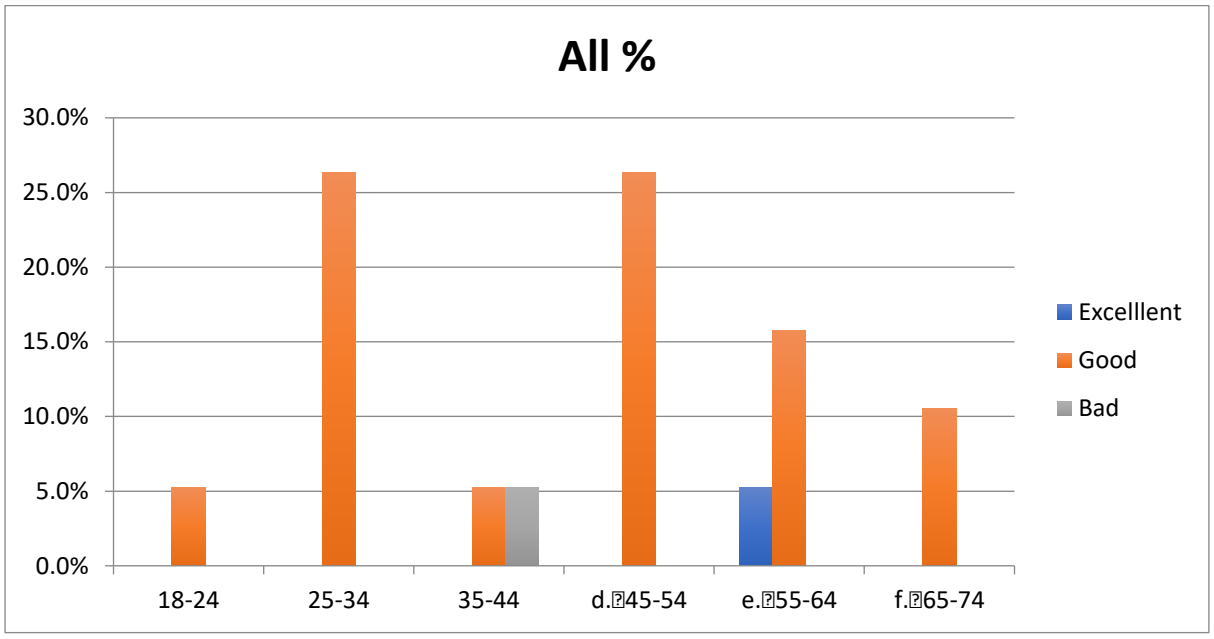

Figure 34 Percentage of participants were of the same age and perceived experience getting day to day tasks done

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.232011
Effect Size (Cramér's V)	Large	0.58158
Sample Size		19

Table 57 Chi-Square Test

There is no statistically significant relationship between Q1: What is your Age? and Q7: How did it feel getting day to day work done?

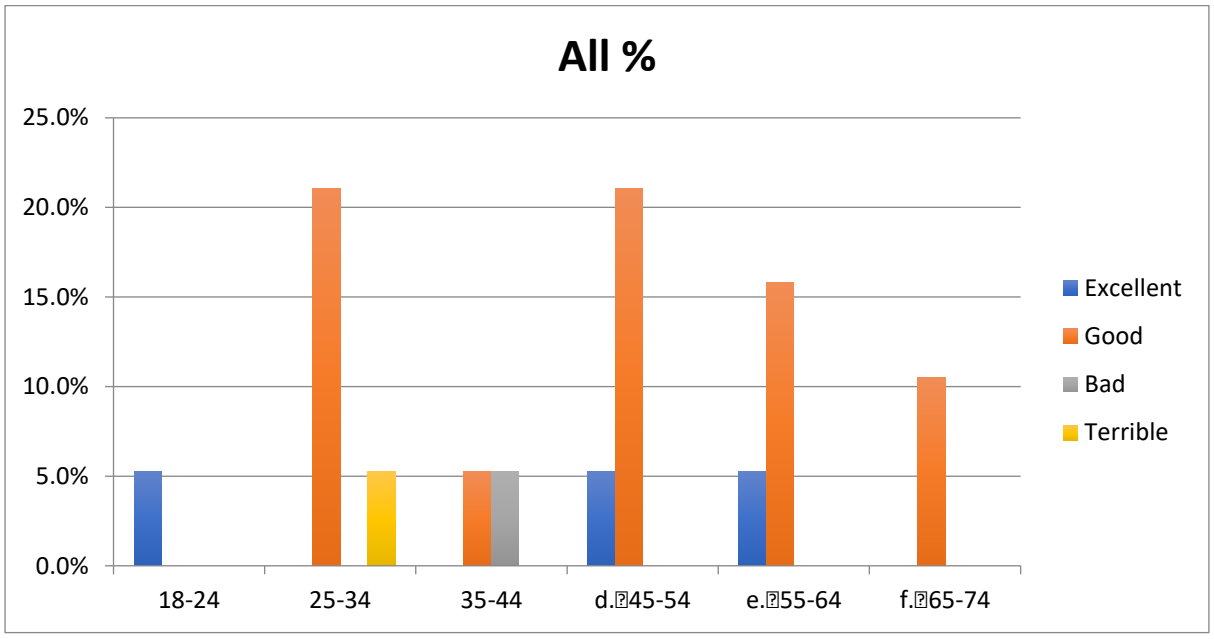

Figure 35 Percentage of participants were of the same age and how participants felt they were getting day to day tasks done

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.23169
Effect Size (Cramér's V)	Large	0.571478
Sample Size		19

Table 58 Chi-Square Test

There is no statistically significant relationship between Q1: What is your Age? and Q12: How did you feel about the information you find on your own?

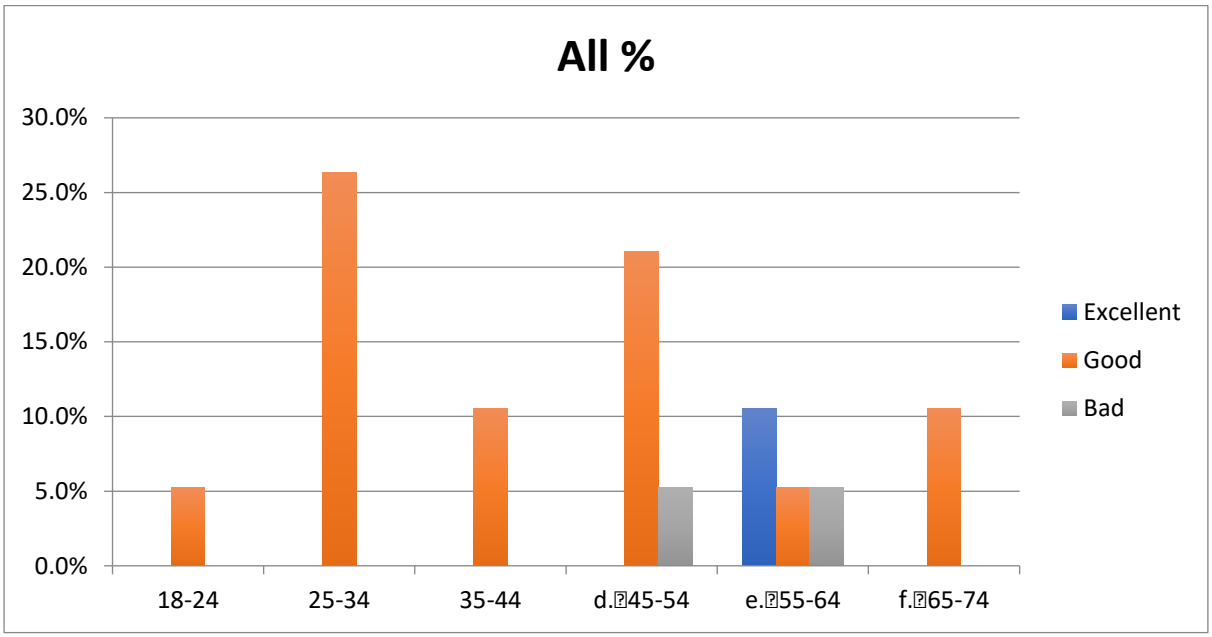

Figure 36 Percentage of participants were of the same age, and how they feel about information they gathered on their own

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.297859
Effect Size (Cramér's V)	Large	0.557524
Sample Size		19

Table 59 Chi-Square Test

There is no statistically significant relationship between Q1: What is your Age? and Q11: What do you think of using a machine providing you with information?

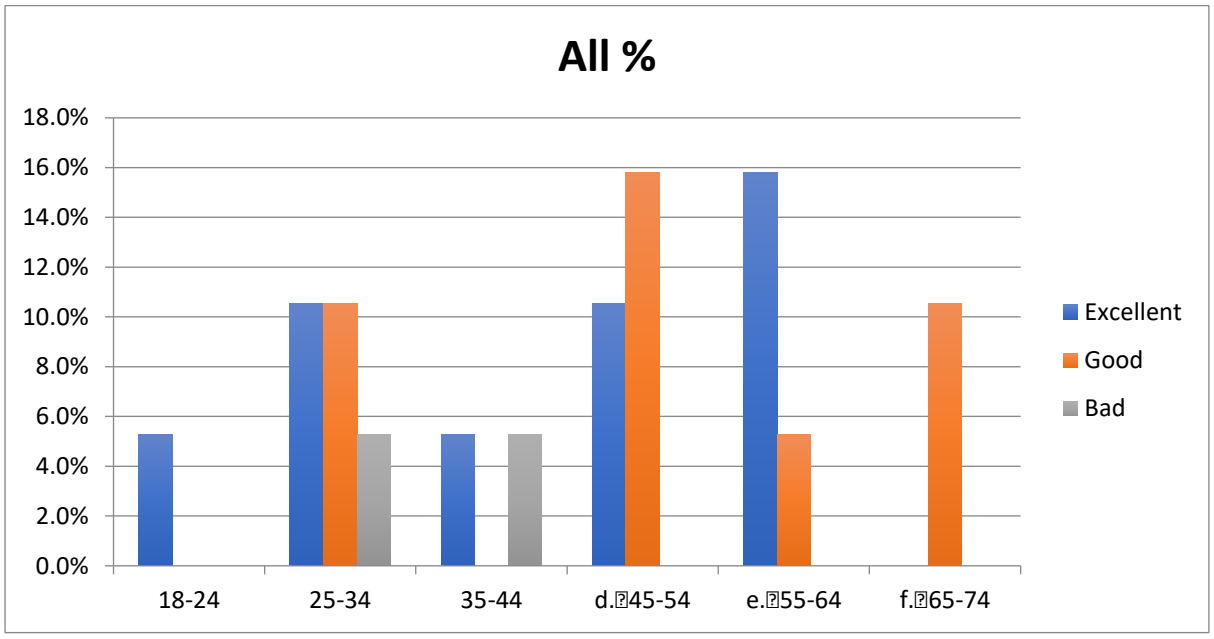

Figure 37 Percentage of participants were of the same age and how they felt giving a machine information

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.400837
Effect Size (Cramér's V)	Large	0.524735
Sample Size		19

Table 60 Chi-Square Test

There is no statistically significant relationship between Q1: What is your Age? and Q2: Type of practice

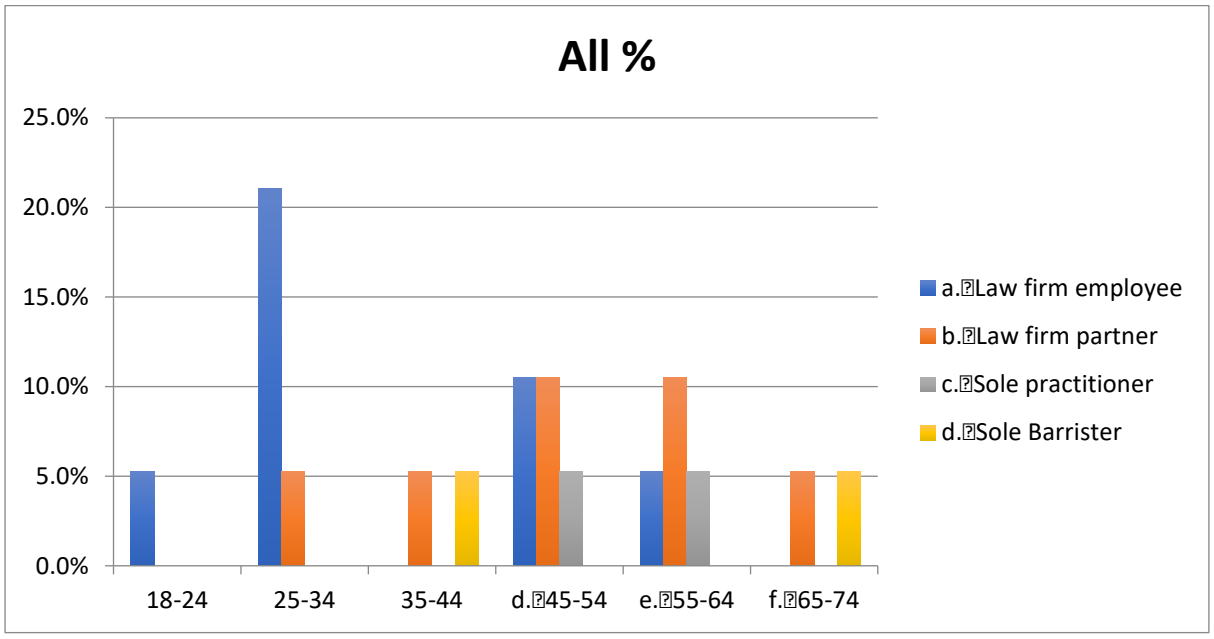

Figure 38 Percentage of participants were of the same age and participants type of practice

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.423944
Effect Size (Cramér's V)	Large	0.519558
Sample Size		19

Table 61 Chi-Square Test

No statistical tests could be run because only one group (All answered Yes) in Q5: Have you used software to assist you with your work before?

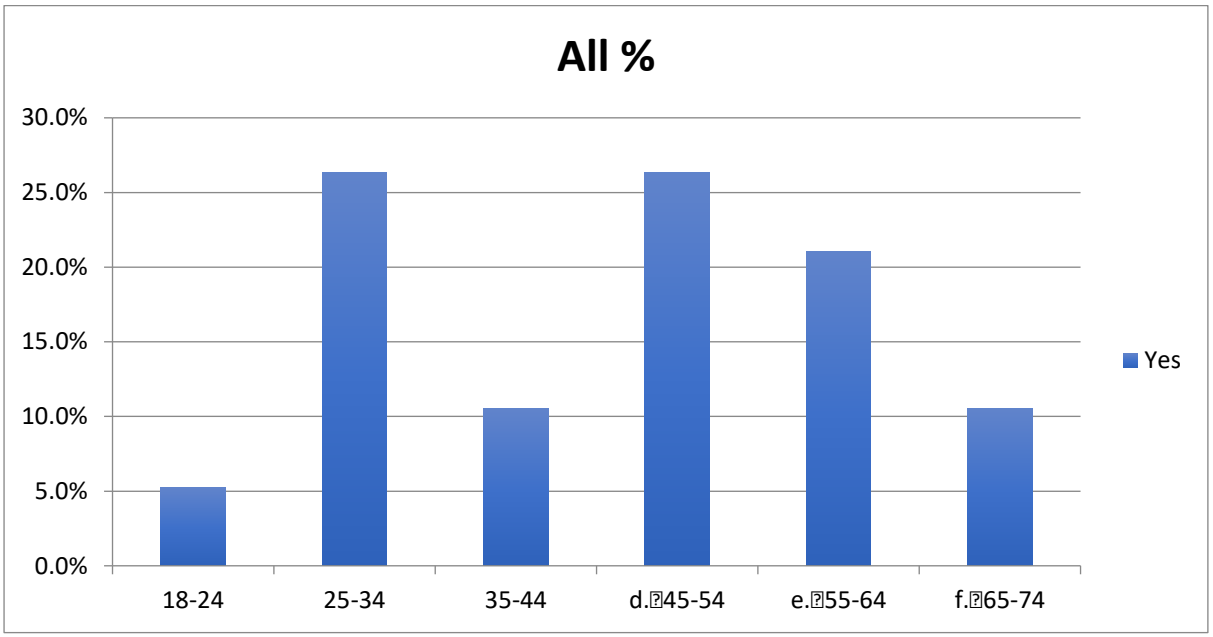

Figure 39 Percentage of participants were of the same age, and participants believe they have used similar technology before

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	1
Effect Size (Cramér's V)	No relationship	NaN
Sample Size		19

Table 62 Chi-Square Test

4.2.3.1.2 Type of Practice

There is a strong statistically significant relationship between Q2: Type of practice and Q10: What was your experience getting day to day tasks done?

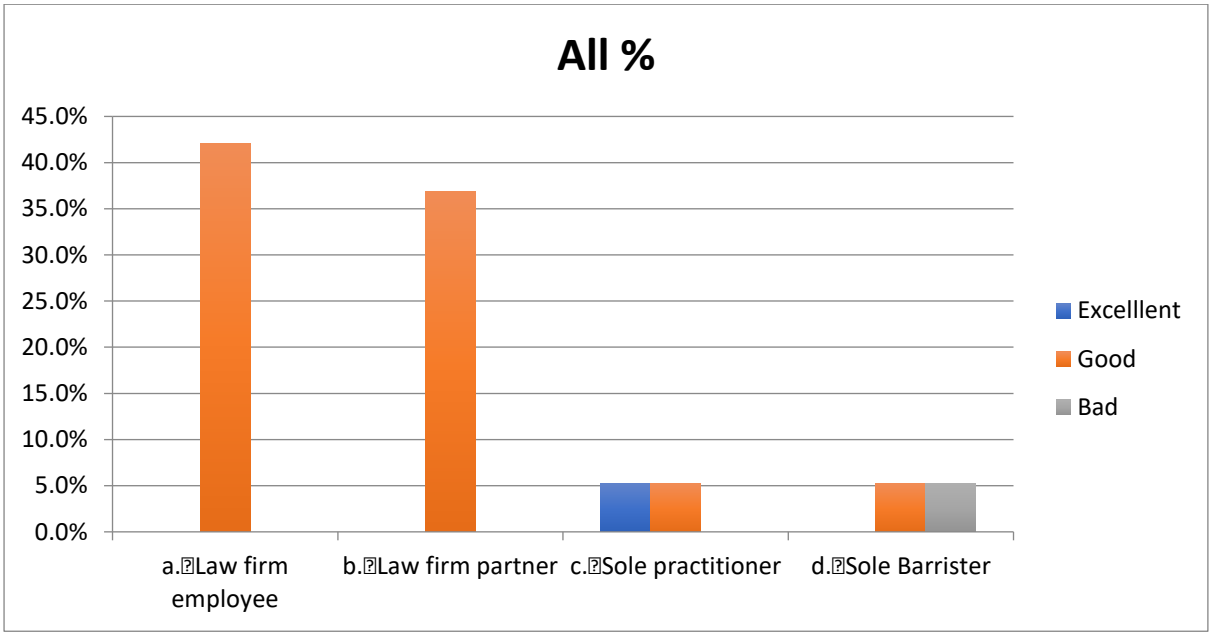

Figure 40 Percentage of participants were of the same practice and their experience getting day to day tasks done

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Very clearly significant	0.006533
Effect Size (Cramér's V)	Large	0.685994
Sample Size		19

Table 63 Chi-Square Test

A strong statistically significant relationship between Q2: Type of practice and Q3: Level of Degree?

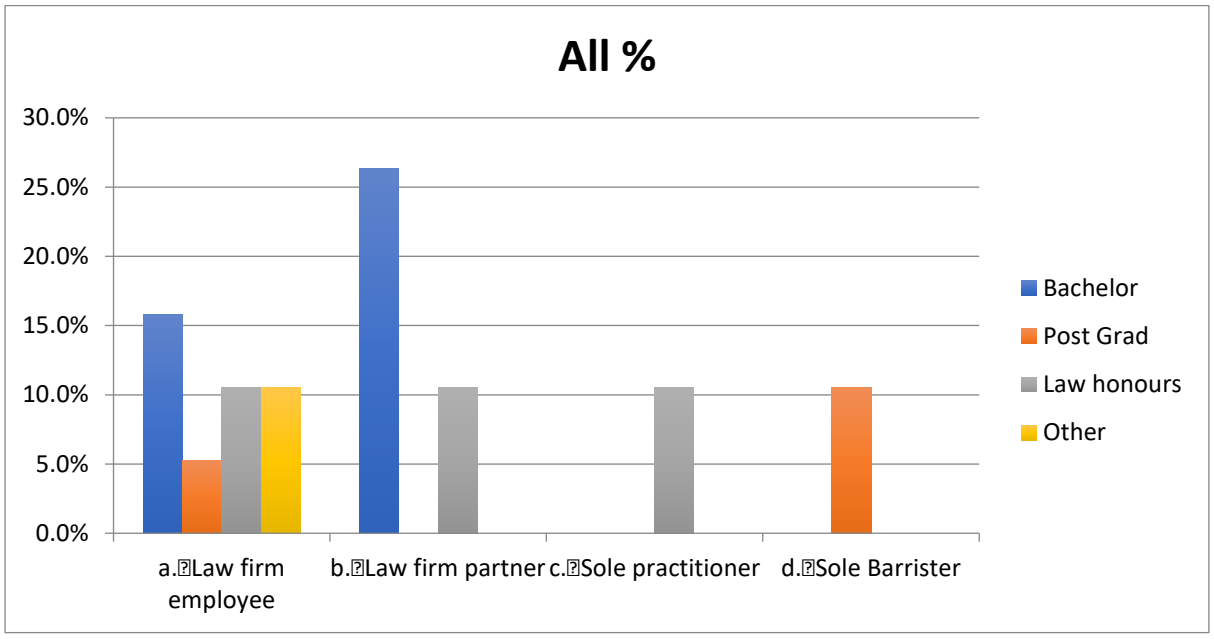

Figure 41 Percentage of participants were of the same practice and their level of degree

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Very clearly significant	0.017374
Effect Size (Cramér's V)	Large	0.593659
Sample Size		19

Table 64 Chi-Square Test

There is no statistically significant relationship between Q2: Type of practice and Q4: Years of Retention/Practice?

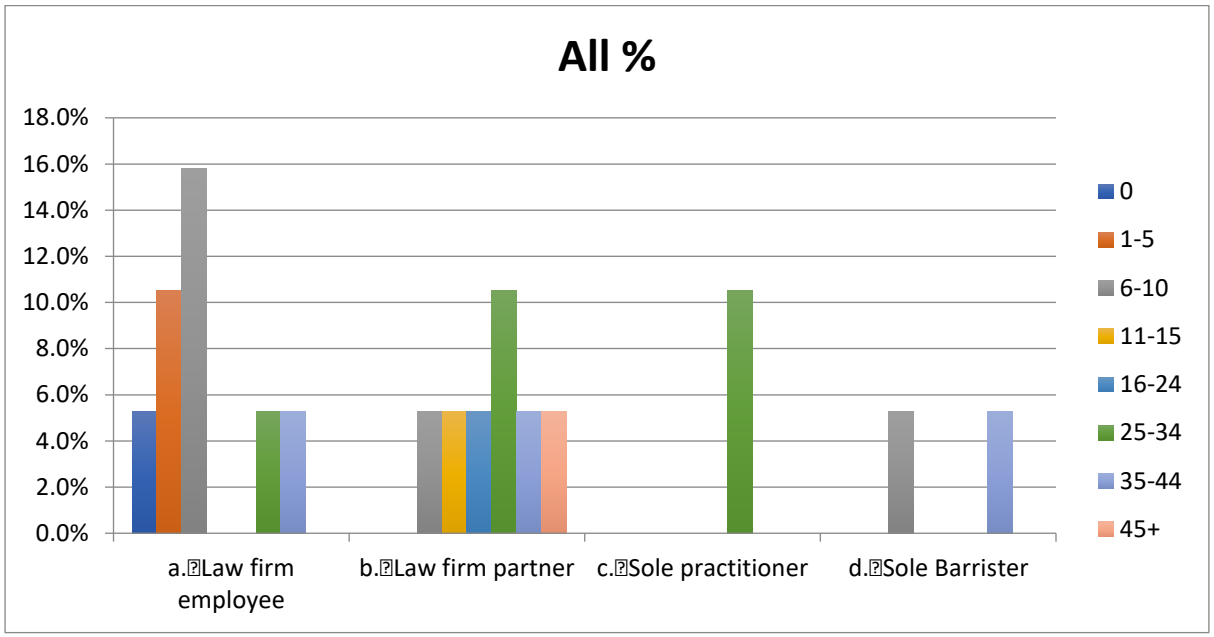

Figure 42 Percentage of participants were of the same practice and years in the practice

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.64297
Effect Size (Cramér's V)	Large	0.563436
Sample Size		19

Table 65 Chi-Square Test

There is no statistically significant relationship between Q2: Type of practice and Q1: What is your Age?

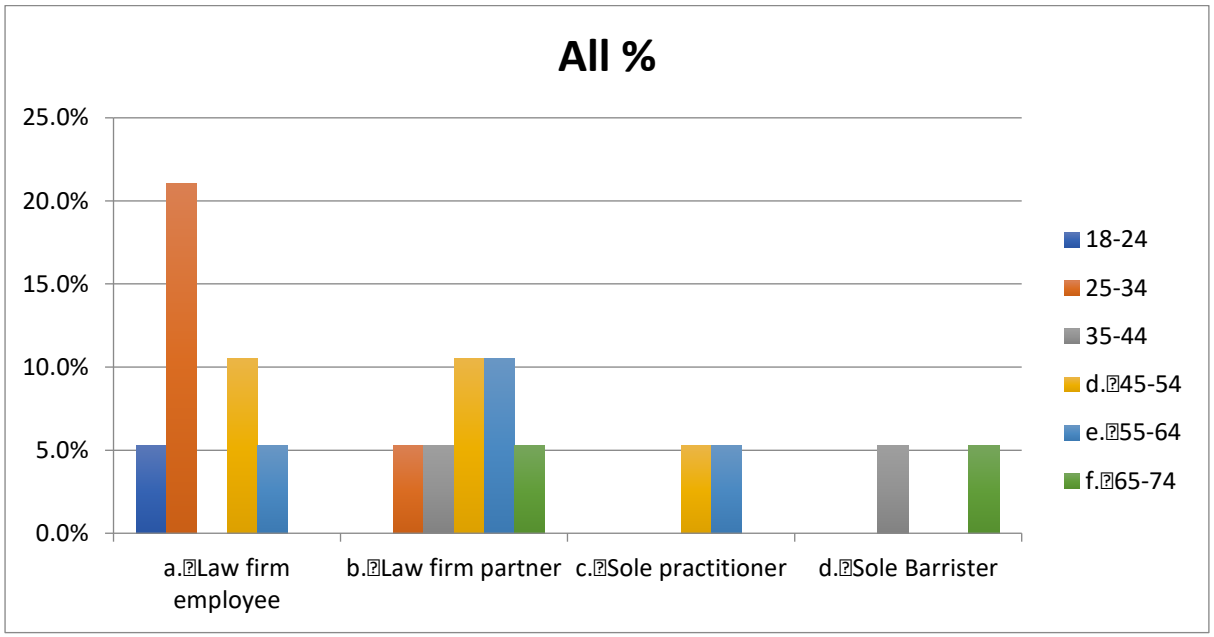

Figure 43 Percentage of participants were of the same practice and their age

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.423944
Effect Size (Cramér's V)	Large	0.519558
Sample Size		19

Table 66 Chi-Square Test

There is no statistically significant relationship between Q2: Type of practice and Q7: How did it feel getting day to day work done?

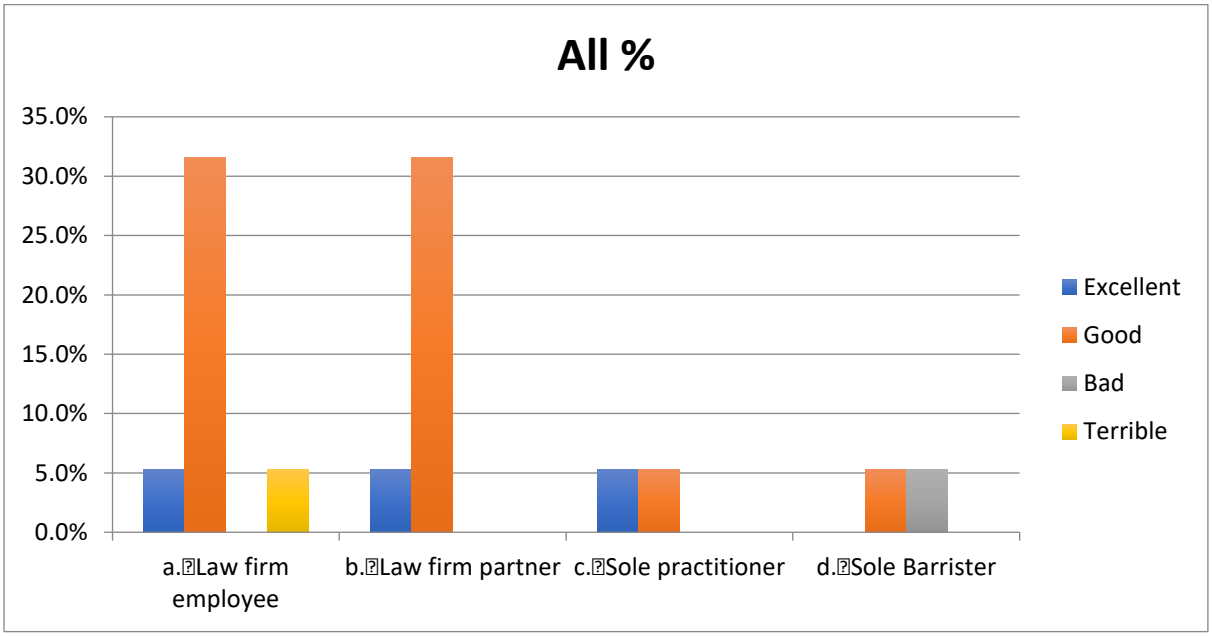

Figure 44 Percentage of participants were of the same practice and how they felt getting day to day work done

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.203244
Effect Size (Cramér's V)	Large	0.462297
Sample Size		19

Table 67 Chi-Square Test

There is no statistically significant relationship between Q2: Type of practice and Q12: How did you feel about the information you find on your own?

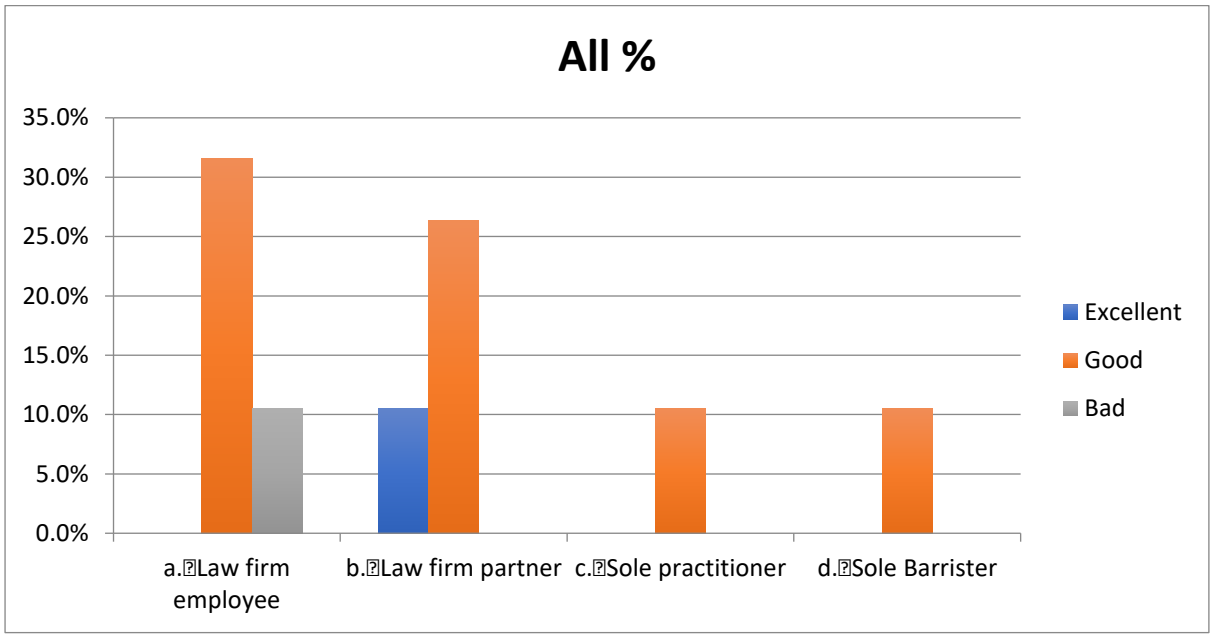

Figure 45 Percentage of participants were of the same practice and how they felt getting their information

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.372745
Effect Size (Cramér's V)	Large	0.412599
Sample Size		19

Table 68 Chi-Square Test

There is no statistically significant relationship between Q2: Type of practice and Q11: What do you think of using a machine providing you with information?

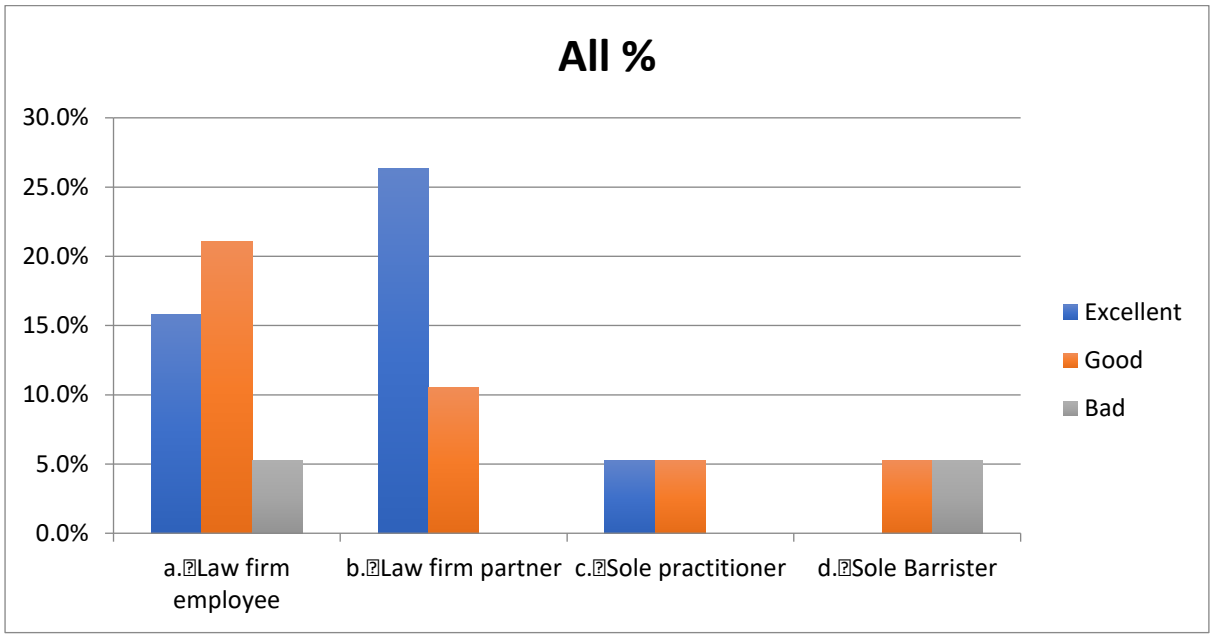

Figure 46 Percentage of participants were of the same practice and providing information to a machine

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.380961
Effect Size (Cramér's V)	Large	0.410067
Sample Size		19

Table 69 Chi-Square Test

No statistical tests could be run because there is only one group in Q5: Have you used software to assist you with your work before?

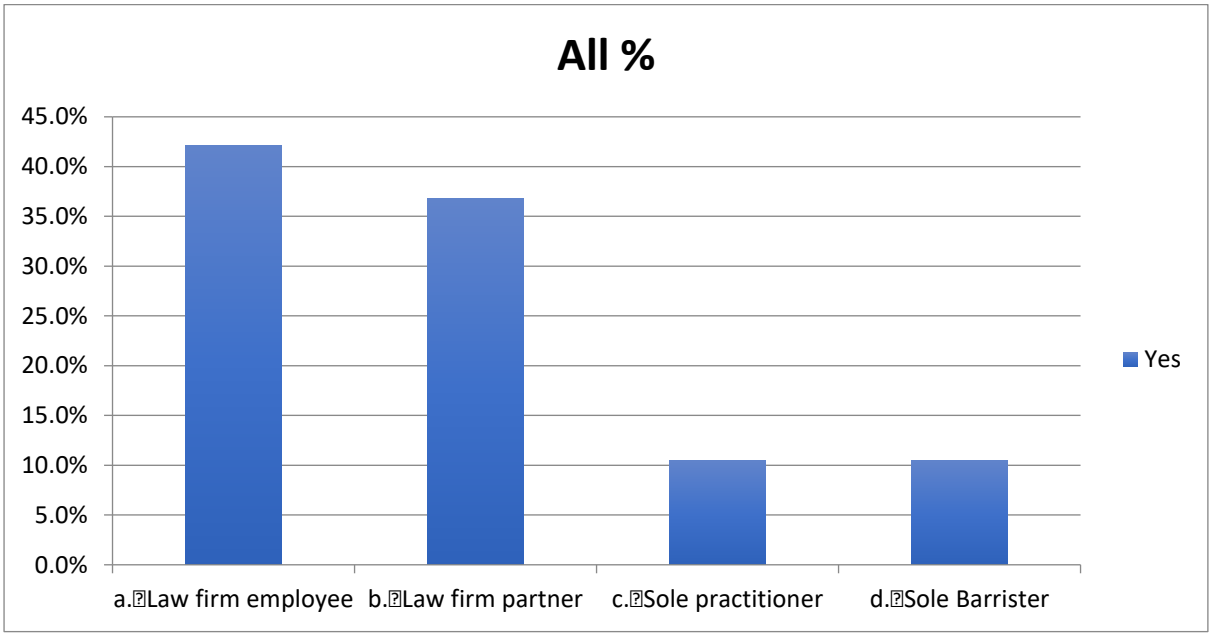

Figure 47 Percentage of participants were of the same practice and if they have used similar software before

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	1
Effect Size (Cramér's V)	No relationship	NaN
Sample Size		19

Table 70 Chi-Square Test

4.2.3.2 Post-Test

4.2.3.2.1 Age

There is a strong statistically significant relationship between Q1: What is your Age? and Q11: What was your experience like learning this website?

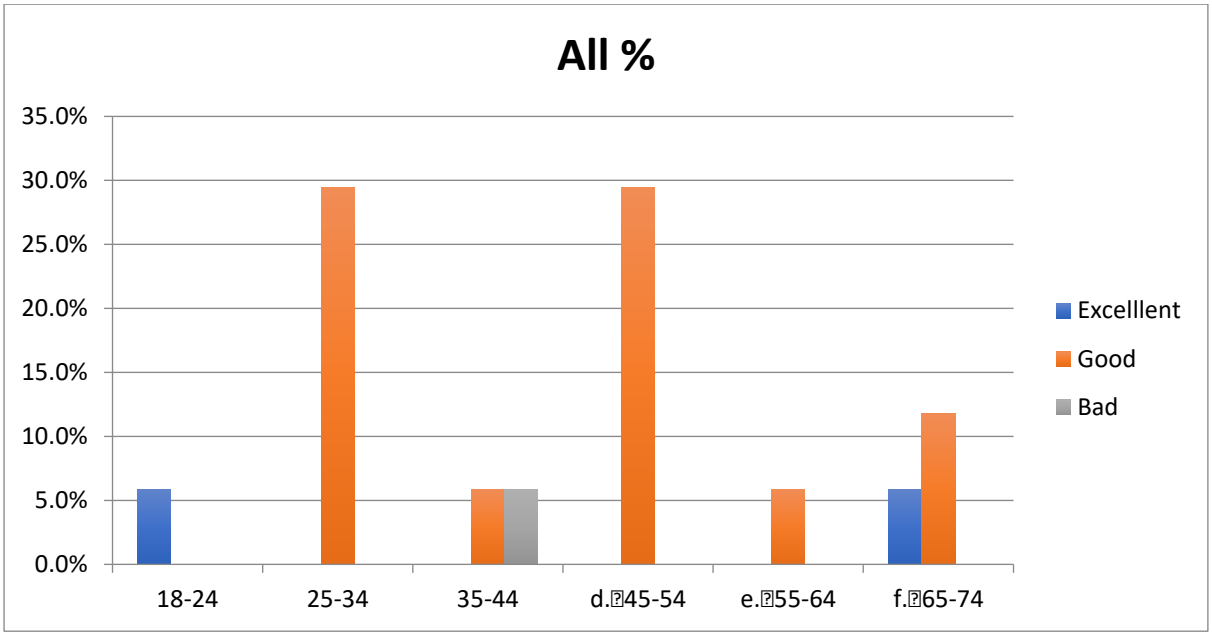

Figure 48 Percentage of participants were of the age and learning the website

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Significant	0.048329
Effect Size (Cramér's V)	Large	0.73598
Sample Size		17

Table 71 Chi-Square Test

There is a strong statistically significant relationship between Q1: What is your Age? and Q4: Years of Retention/Practice?

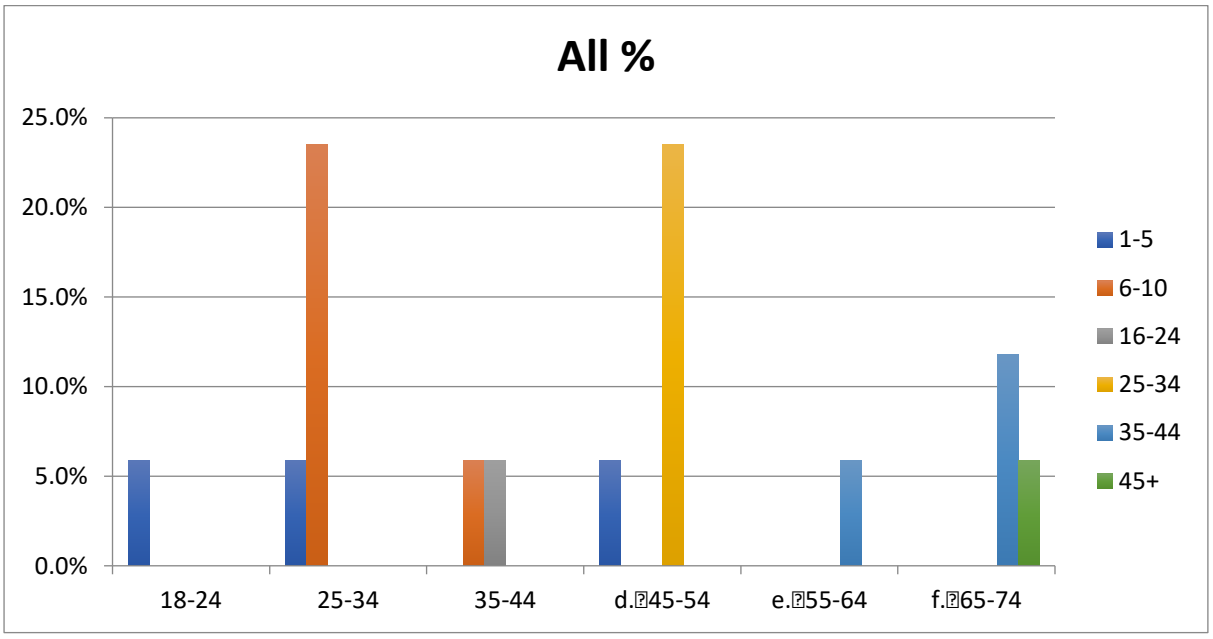

Figure 49 Percentage of participants were of the age and years of retention/practice

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Very clearly significant	0.009523
Effect Size (Cramér's V)	Large	0.723571
Sample Size		17

Table 72 Chi-Square Test

There is no statistically significant relationship between Q1: What is your Age? and Q3: Level of Degree?

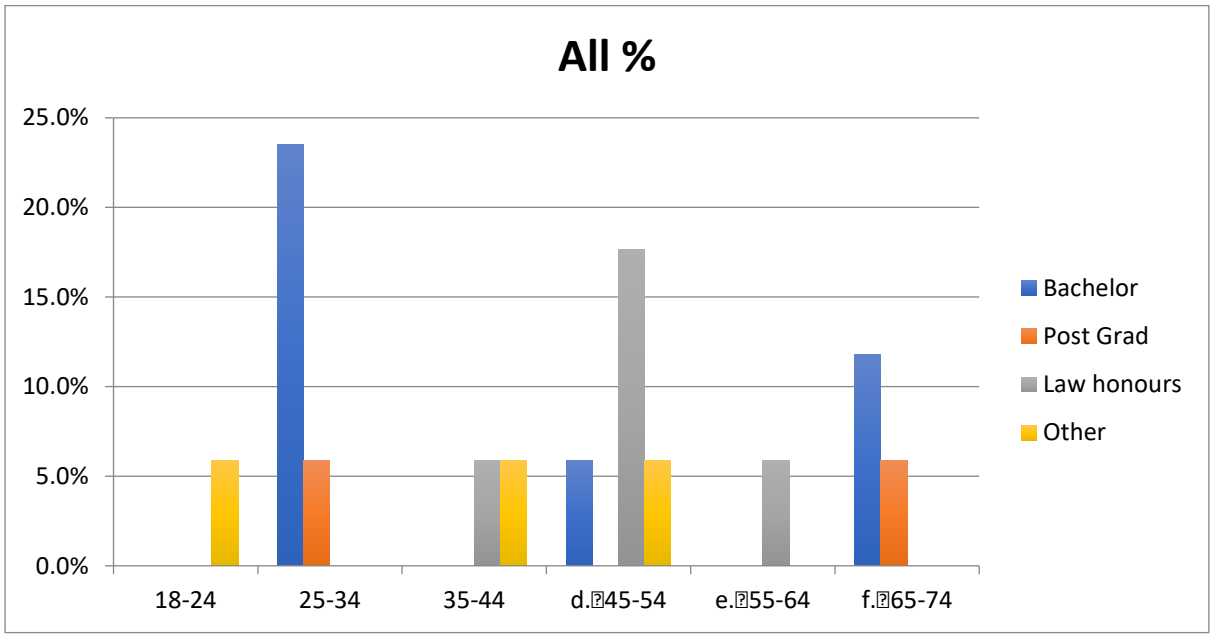

Figure 50 Percentage of participants were of the age and level of degree

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.17651
Effect Size (Cramér's V)	Large	0.624373
Sample Size		17

Table 73 Chi-Square Test

There is no statistically significant relationship between Q1: What is your Age? and Q2: Type of practice

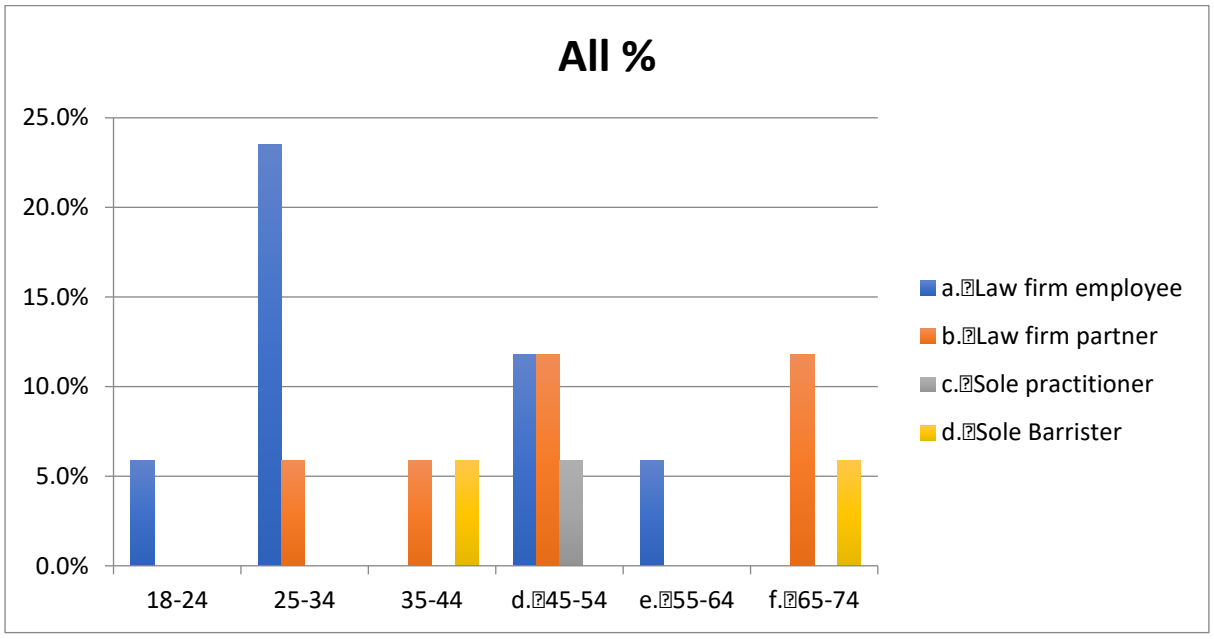

Figure 51 Percentage of participants were of the age and type of practice

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.505825
Effect Size (Cramér's V)	Large	0.5288
Sample Size		17

Table 74 Chi-Square Test

There is no statistically significant relationship between Q1: What is your Age? and Q5: Have you used other similar technologies/applications before?

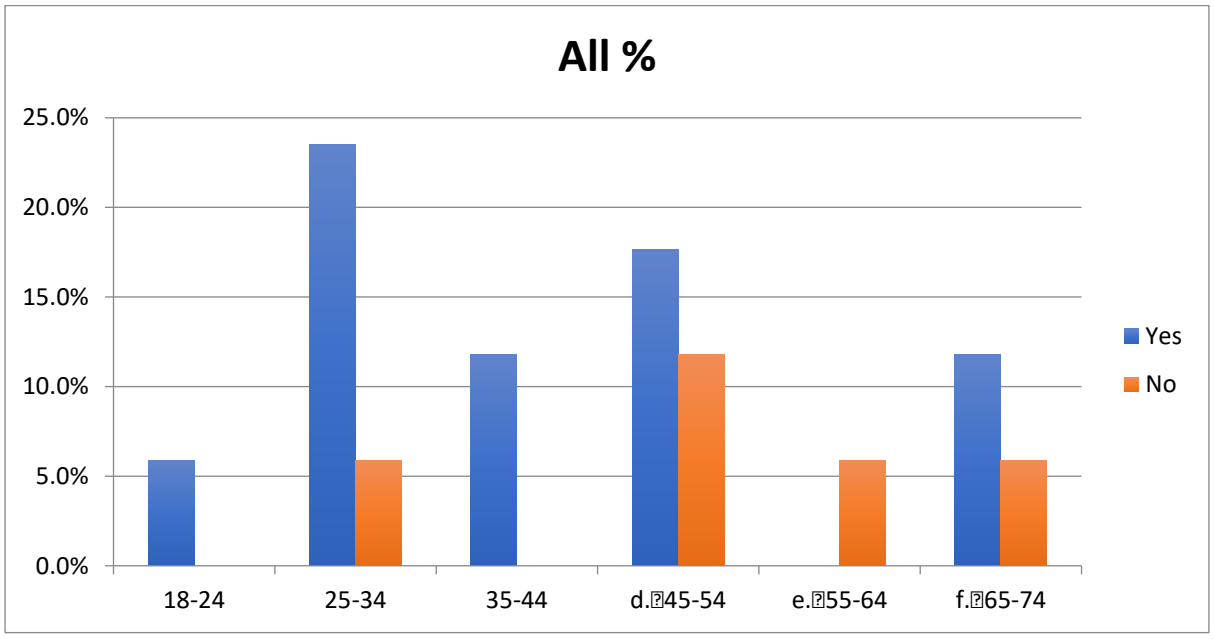

Figure 52 Percentage of participants were of the age and the use of similar technologies

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.527244
Effect Size (Cramér's V)	Medium	0.494413
Sample Size		17

Table 75 Chi-Square Test

There is no statistically significant relationship between Q1: What is your Age? and Q12: What do you think of using a machine providing you with information?

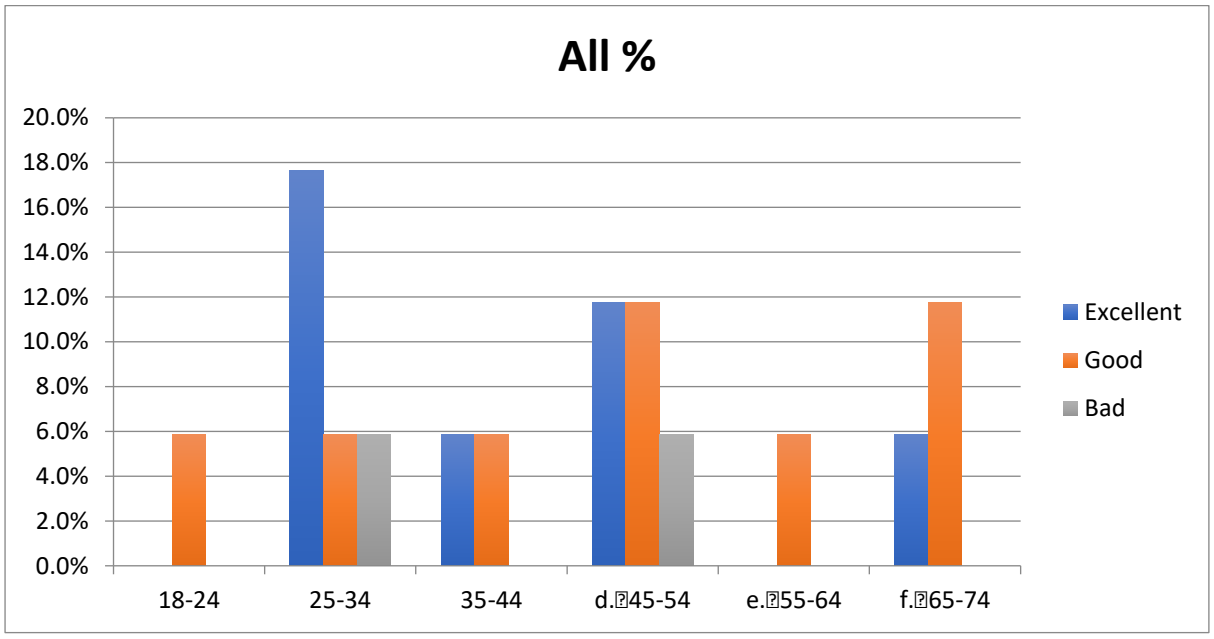

Figure 53 Percentage of participants were of the age and providing information to a machine

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.890581
Effect Size (Cramér's V)	Large	0.383825
Sample Size		17

Table 76 Chi-Square Test

There is no statistically significant relationship between Q1: What is your Age? and Q7: How did it feel to use this website?

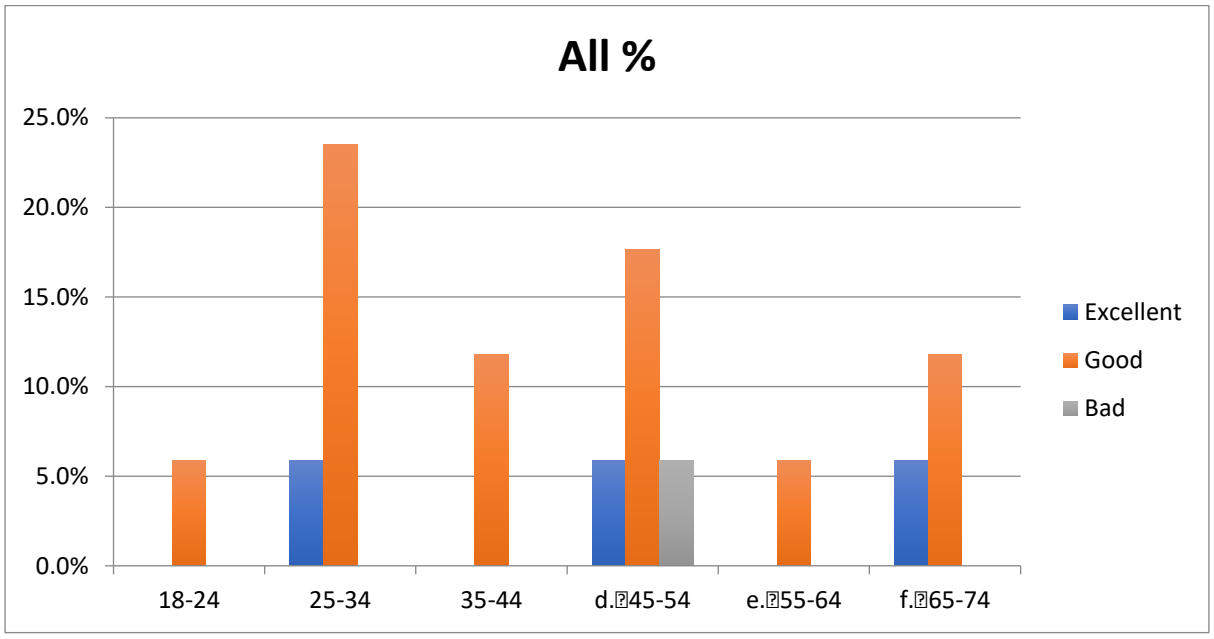

Figure 54 Percentage of participants were of the age and how did it feel using the website

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.94421
Effect Size (Cramér's V)	Medium	0.345916
Sample Size		17

Table 77 Chi-Square Test

4.2.3.2.2 Type of Practice

There is no statistically significant relationship between Q1: What is your Age? and Q2: Type of practice

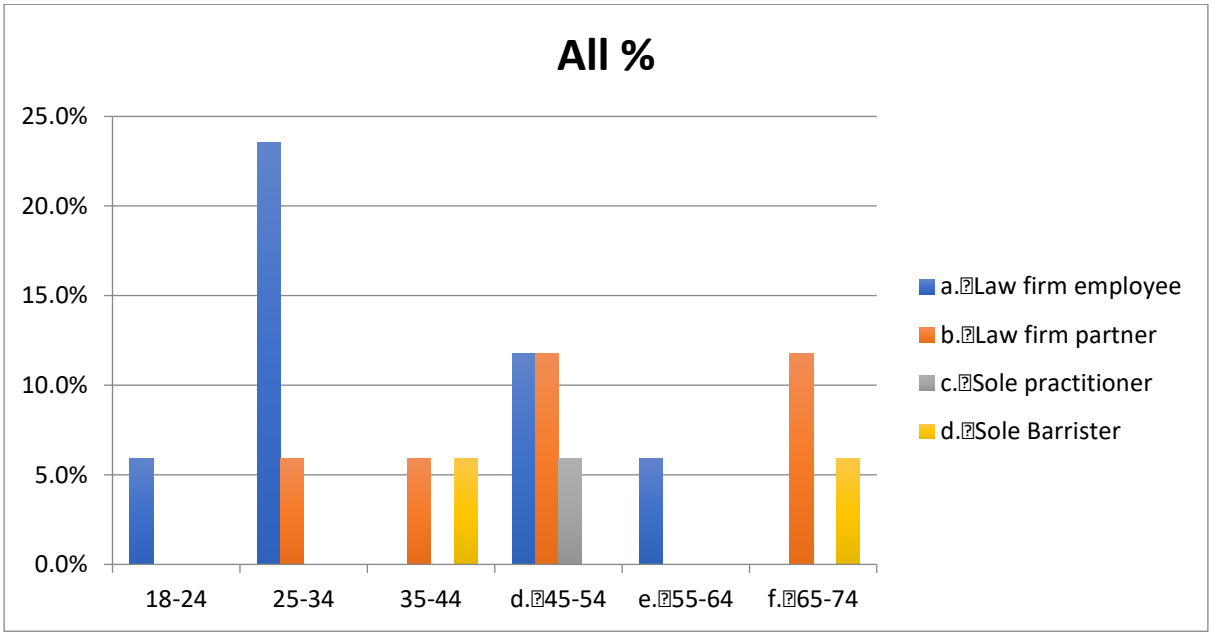

Figure 55 Percentage of participants were of the age and participants type of practice

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.505825
Effect Size (Cramér's V)	Large	0.5288
Sample Size		17

Table 78 Chi-Square Test

There is no statistically significant relationship between Q4: Years of Retention/Practice? and Q2: Type of practice

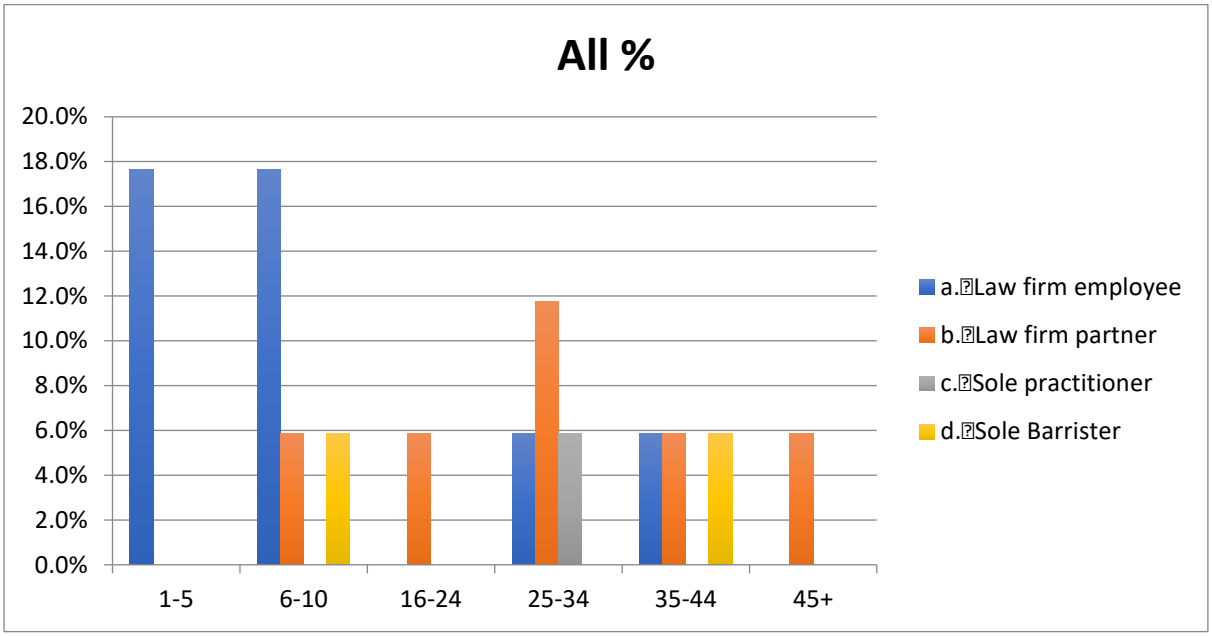

Figure 56 Percentage of participants were of the type of practice and years of retention/practice

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.584227
Effect Size (Cramér's V)	Large	0.509402
Sample Size		17

Table 79 Chi-Square Test

There is no statistically significant relationship between Q3: Level of Degree? and Q2: Type of practice

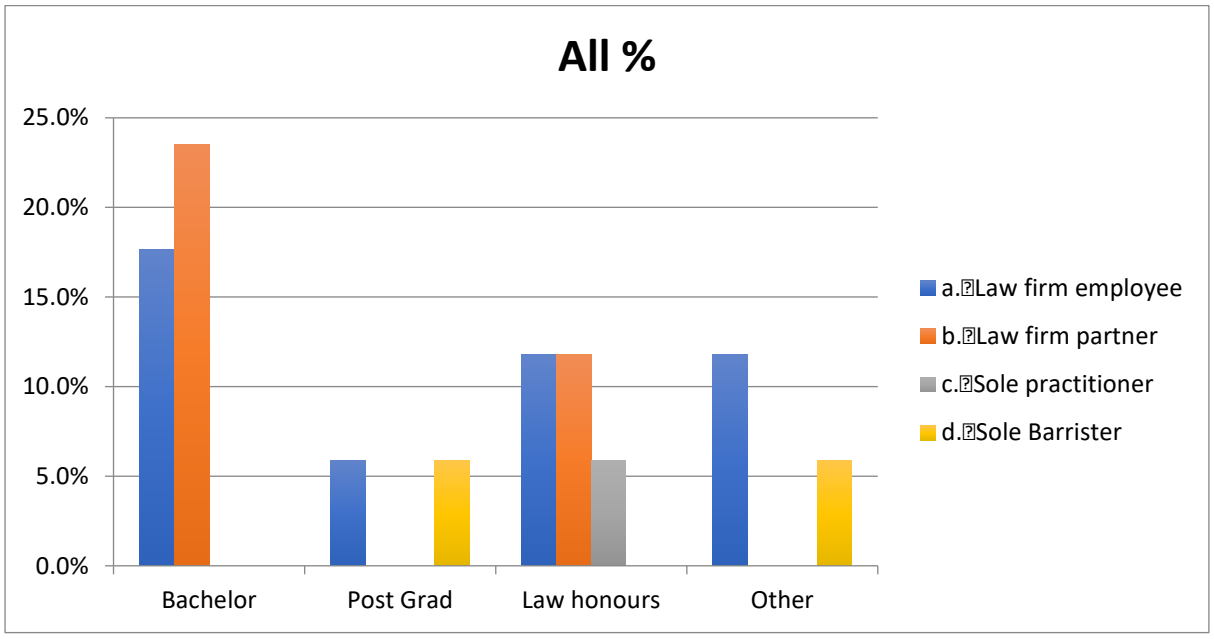

Figure 57 Percentage of participants were of the type of practice and level of degree

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.30751
Effect Size (Cramér's V)	Large	0.454911
Sample Size		17

Table 80 Chi-Square Test

There is no statistically significant relationship between Q5: Have you used other similar technologies/applications before?

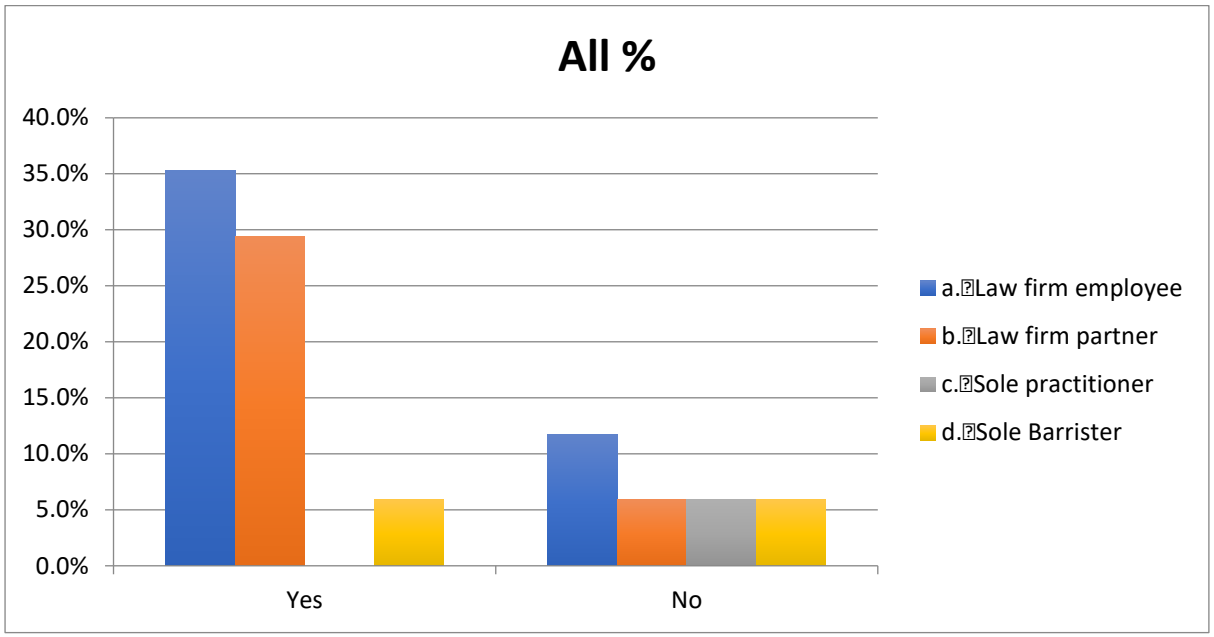

Figure 58 Percentage of participants were of the type of practice and the use of similar technologies

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.340364
Effect Size (Cramér's V)	Medium	0.444097
Sample Size		17

Table 81 Chi-Square Test

There is no statistically significant relationship between Q12: What do you think of using a machine providing you with information? and Q2: Type of practice

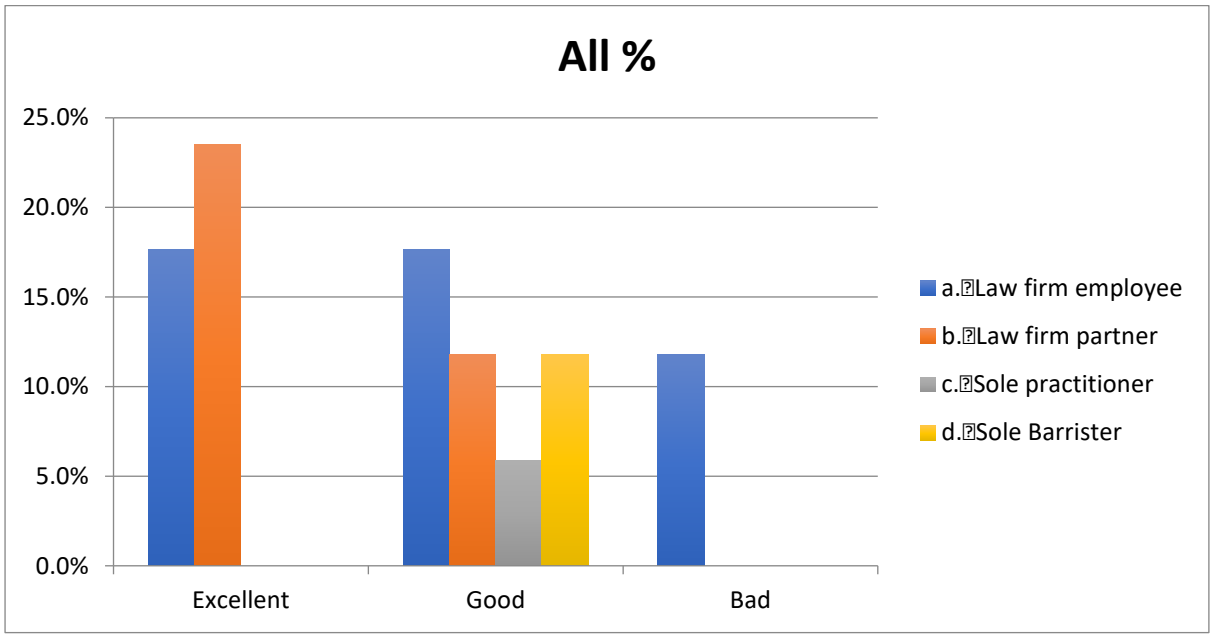

Figure 59 Percentage of participants were of the type of practice and providing a machine with information

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.355363
Effect Size (Cramér's V)	Large	0.441942
Sample Size		17

Table 82 Chi-Square Test

There is no statistically significant relationship between Q9: Did you have any issues using the website? Examples: Inaccuracies Missing information and Q2: Type of practice

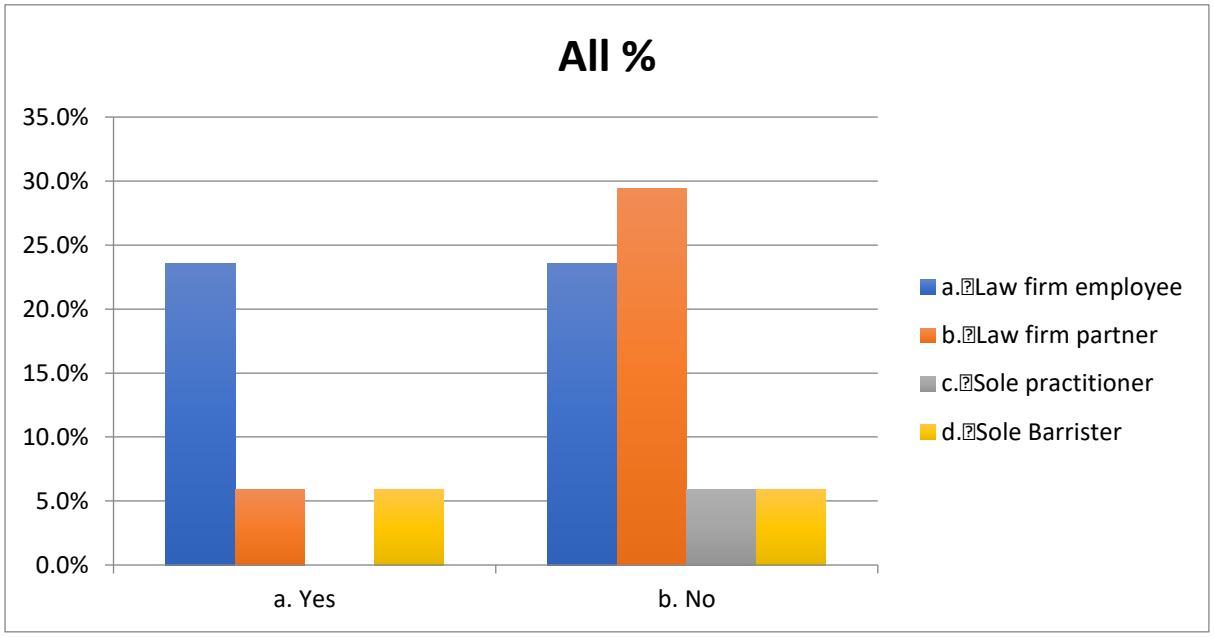

Figure 60 Percentage of participants were of the type of practice and issues with the website

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.492883
Effect Size (Cramér's V)	Medium	0.376051
Sample Size		17

Table 83 Chi-Square Test

There is no statistically significant relationship between Q7: How did it feel to use this website? and Q2: Type of practice

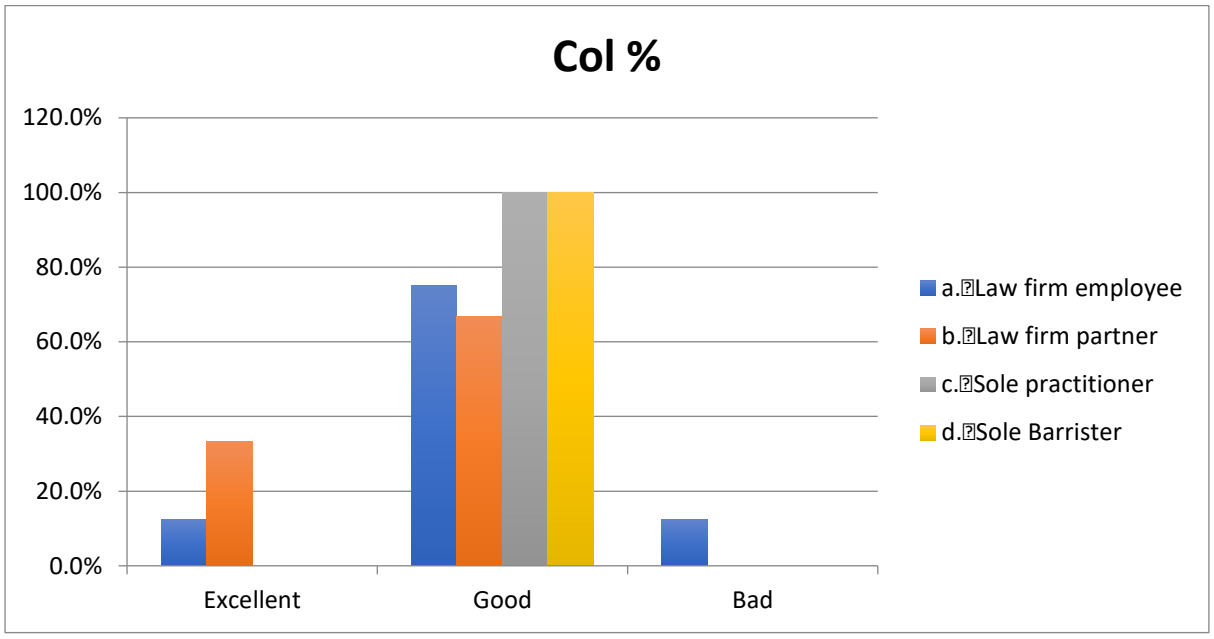

Figure 61 Percentage of participants were of the type of practice and feeling to use the website

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.820551
Effect Size (Cramér's V)	Medium	0.292353
Sample Size		17

Table 84 Chi-Square Test

There is no statistically significant relationship between Q11: What was your experience like learning this website? and Q2: Type of practice

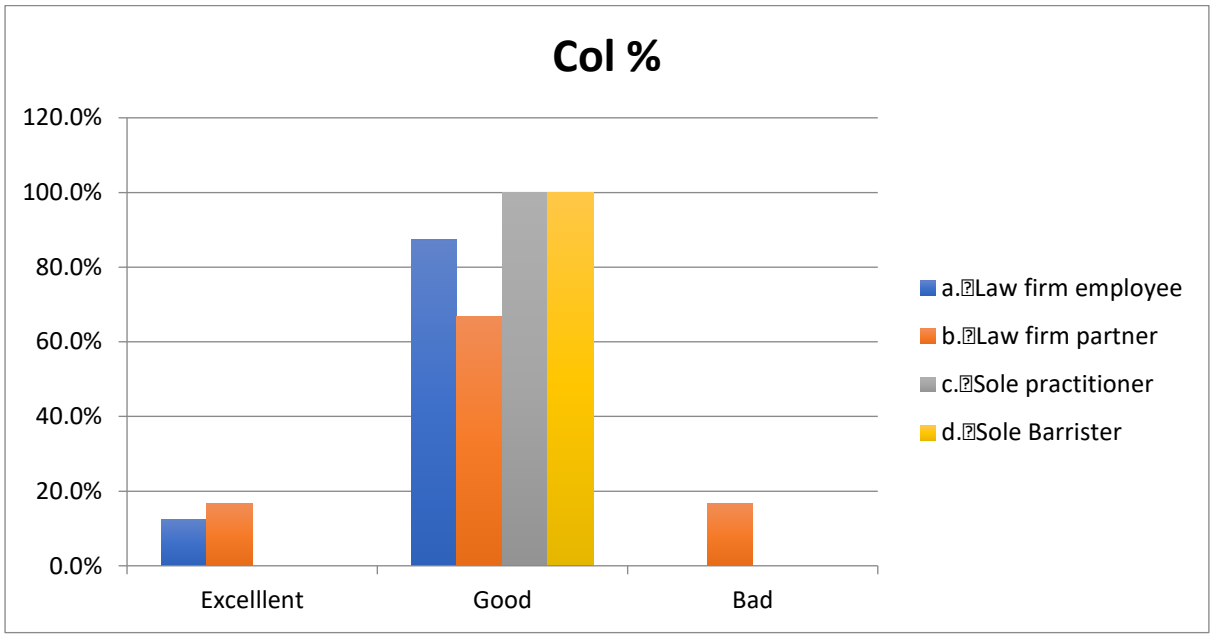

Figure 62 Percentage of participants were of the type of practice and experience learning the website

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.853534
Effect Size (Cramér's V)	Medium	0.278174
Sample Size		17

Table 85 Chi-Square Test

There is no statistically significant relationship between Q13: How did you feel the information the application gave? and Q2: Type of practice

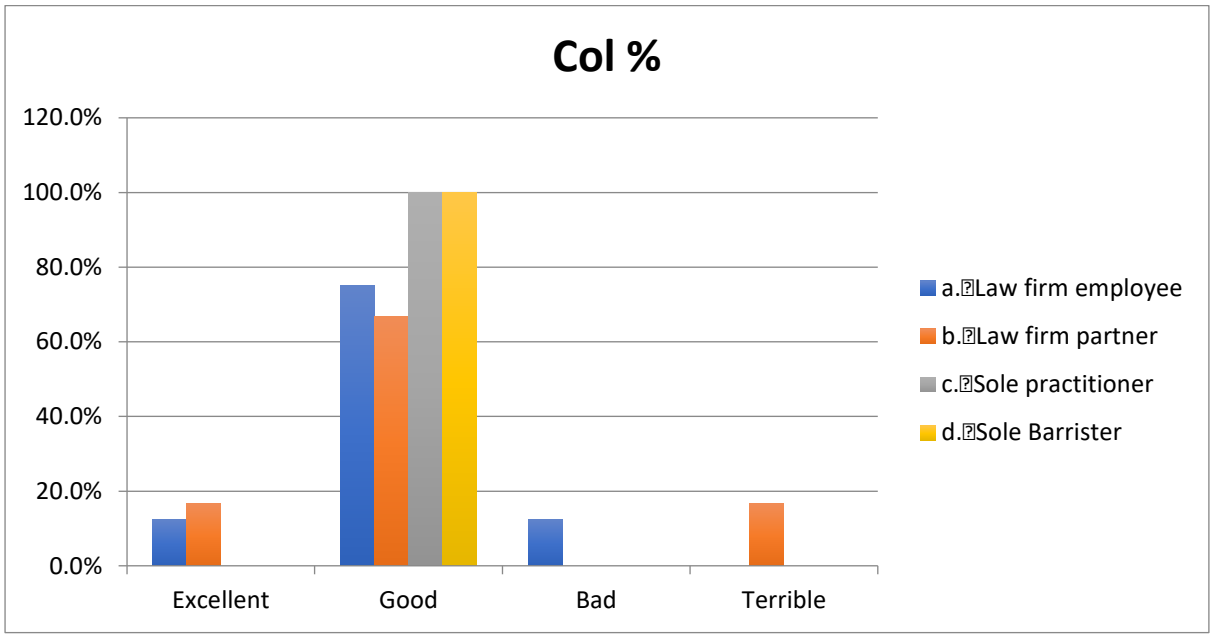

Figure 63 Percentage of participants were of the type of practice and giving information to the application

Chi-Squared Test		
	Basic	Advanced
Statistical Significance (P-Value)	Not significant	0.928128
Effect Size (Cramér's V)	Medium	0.270525
Sample Size		17

Table 86 Chi-Square Test

4.2.4 Two-way ANOVA

The researcher used two-way ANOVA (Analysis of Variance) to determine the interaction between two or more groups. Variance tells you if there are any statistical differences between the means of three or more independent groups. Codes can be found in the section labelled Coding.

4.2.4.1 Pre-Test

		Q1: What is your Age?							
		Total	0-17	18-24	25-34	35-44	d. 45-54	e. 55-64	f. 65-74	g. 75+
Q3: Level of Degree?	Average	2.1		4.0	1.2	2.5	2.4	2.5	1.5	
	ANOVA Result	0.2626361477343876								
Q7: How did it feel getting day to day work done?	Average	2.0		1.0	2.4	2.5	1.8	1.8	2.0	
	ANOVA Result	0.4851860899405078								
Q4: Years of Retention/Practice?	Average	3.6		0.0	1.8	3.0	3.8	5.5	6.5	
	ANOVA Result	**0.005718305808660951**								
Q10: What was your experience getting day to day tasks done?	Average	2.0		2.0	2.0	2.5	2.0	1.8	2.0	
	ANOVA Result	0.34451307440331547								
Q11: What do you think of using a machine providing you with information?	Average	1.6		1.0	1.8	2.0	1.6	1.3	2.0	
	ANOVA Result	0.73688419427554								

Q12: How did you feel about the information you find on your own?	Average	2.0	2.0	2.0	2.0	2.2	1.8	2.0
	ANOVA Result	0.43415489805521457						
Q5: Have you used software to assist you with your work before?	Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	ANOVA Result	1						

Table 87 ANOVA results based on the age of the participant

Note: ANOVA Results in bold are considered to have results that have a significant difference. An example of one is Q4: Years of Retention/Practice?

		Q2: Type of practice						
		Total	Law firm employee	Law firm partner	Sole practitioner	Sole Barrister	In house lawyer	Other
Q3: Level of Degree?	Average	2.1	2.4	1.6	3.0	2.0		
	ANOVA Result	0.2021458525438149						
Q7: How did it feel getting day to day work done?	Average	2.0	2.1	1.9	1.5	2.5		
	ANOVA Result	0.6869160762400717						
Q4: Years of Retention/Practice?	Average	3.6	2.4	4.6	5.0	4.0		
	ANOVA Result	0.3002915795855746						
Q10: What was your	Average	2.0	2.0	2.0	1.5	2.5		

experience getting day to day tasks done?	ANOVA Result	0.2928932188134523				
Q11: What do you think of using a machine providing you with information ?	Average	1.6	1.8	1.3	1.5	2.5
	ANOVA Result	0.29222693129468413				
Q12: How did you feel about the information you find on your own?	Average	2.0	2.3	1.7	2.0	2.0
	ANOVA Result	**0.049661434975673324**				
Q5: Have you used software to assist you with your work before?	Average	0.0	0.0	0.0	0.0	0.0
	ANOVA Result	1				

Table 88 ANOVA results based on the participants type of practice

Note: ANOVA Results in bold are considered to have results that have a significant difference. An example of one is Q12: How did you feel about the information you find on your own?

4.2.4.2 Post-test

Q1: What is your Age?								
Total	0-17	18-24	25-34	35-44	d. 45-54	e. 55-64	f. 65-74	g. 75+

Q12: What do you think of using a machine providing you with information?	Average	1.7	2.0	1.6	1.5	1.8	2.0	1.7
	ANOVA Result	0.9755422309194897						
Q13: How did you feel the information the application gave?	Average	2.1	2.0	1.8	3.0	2.2	2.0	1.7
	ANOVA Result	0.5027804058237408						
Q11: What was your experience like learning this website?	Average	0.9	0.0	1.0	1.5	1.0	1.0	0.7
	ANOVA Result	0.2973035896937267						
Q9: Did you have any issues using the website? Examples: Inaccuracies Missing information	Average	0.6	1.0	0.6	0.5	0.4	1.0	1.0
	ANOVA Result	0.87933338327254						
Q3: Level of Degree?	Average	2.2	4.0	1.2	3.5	2.8	3.0	1.3
	ANOVA Result	0.06983355221114362						
Q7: How did it feel to use this website?	Average	1.9	2.0	1.8	2.0	2.0	2.0	1.7
	ANOVA Result	0.8104185387334684						
Q4: Years of Retention/Practice ?	Average	3.6	1.0	1.8	3.0	4.2	6.0	6.3
	ANOVA Result	**0.004388093864495013**						

Q5: Have you used other similar technologies/applications before?	Average	0.3	0.0	0.2	0.0	0.4	1.0	0.3
	ANOVA Result	0.8351809638603388						

Table 89 ANOVA results based on the age of the participant

Note: ANOVA Results in bold are considered to have results that have a significant difference. An example of one is, Years of Retention/Practice?

		Q2: Type of practice					
		Total	Law firm employee	Law firm partner	Sole practitioner	Sole Barrister	In house lawyer
Q12: What do you think of using a machine providing you with information?	Average	1.7	1.9	1.3	2.0	2.0	
	ANOVA Result	0.18780724080147648					
Q13: How did you feel the information the application gave?	Average	2.1	2.0	2.2	2.0	2.0	
	ANOVA Result	0.9533361687130529					
Q11: What was your experience like learning this website?	Average	0.9	0.9	1.0	1.0	1.0	
	ANOVA Result	0.6935416883855415					
Q9: Did you have any issues using the website? Examples: Inaccuracies Missing information	Average	0.6	0.5	0.8	1.0	0.5	
	ANOVA Result	0.548097618405686					

Q3: Level of Degree?	Average	2.2	2.4	1.7	3.0	3.0
	ANOVA Result	0.46083983211783897				
Q7: How did it feel to use this website?	Average	1.9	2.0	1.7	2.0	2.0
	ANOVA Result	0.27395165610682737				
Q4: Years of Retention/Practice?	Average	3.6	2.5	4.8	5.0	4.0
	ANOVA Result	0.2746575432781748				
Q5: Have you used other similar technologies/applications before?	Average	0.3	0.3	0.2	1.0	0.5
	ANOVA Result	0.8449629164380775				

Table 90 ANOVA results based on the participants type of practice

Note: ANOVA Results in bold are considered to have results that have a significant difference.

4.3 Conclusion

The descriptive results showed legal professionals would gladly provide their options on this technology. There were limitations on the participant having the available time as they have their job and the tasks at their work take priority. There is a feeling of lack of participants as there does seem to be more information needed from the participants to find the gap as to why some don't think it could be used, this lack of information is also on how participants are express their thoughts through a survey. In a survey, they have no need to explain themselves more clearly compared to face to face interviews. There are issues with how the information is presented. The Chi-Square showed that there is a relationship between the type of practice

and their experience getting day-to-day tasks done and type of practice and level of degree; however, this changes when it comes to day to day tasks done and type of practice and level of degree comes to post-test as there are fewer participants. There appears to be a relation between age and years of retention/practice and age and their experience learning the technology. ANOVA showed that age is significant when it is concerning years of retention/practice.

5 Discussion

This chapter discussed the relationship between the independent variables and dependent variables and how these variables are related to the theoretical framework (the modified TAM) is carried out. Using the findings from the literature review in chapter 2 and the analysis results in chapter 4, the interconnections of the modified TAM framework and the variable are discussed in detail. The modified TAM framework with the moderating variables, the independent variables, and the dependent variable is provided below (see **Error! Reference source not found.**). In this section, the results of the descriptive analysis are summarised on RQ and compared with finding from Literature Review. Section 5.3 discusses the results of the Chi-Square results. Section 5.4 discusses the results of the ANOVA test. Lastly, section 5.5 presents the conclusion of this chapter.

5.1 Discussion on Literature

The literature is used to influence the research questions to determine if this is feasible and find the research gap. Literature influencing the questions leads to questions being made due to the literature so that the literature does not answer the questions. Otherwise, there is no research gap. The research questions are answered with Descriptive Analysis. Below discusses how the literature influenced the questions.

RQ 1. What are the factors that allow Natural language processing to work within New Zealand Law System?

The main research question is to discover the factors to allow for NLP to be integrated as the literature in law found in the sections NLP in Law and NLP in New Zealand. Those examples

made an NLP application but did not test it with people in the legal field. That lack of people to test the NLP features was to find if the factors are the same or if the factors change now that participants are involved.

RQ 1.1. What will be the variation of what the lawyer perceives as useful depending on which department the lawyer belongs to?

RQ 1.1 comes from the Examples of NLP, Potential Issues for NLP in Law, and English Language sections where NLP applications are made depending on the attended audience.

RQ 1.2. What are the factors of the lawyer affect how comfortable they are with technology?

A question focusing on a lawyer's comfortability comes from finding examples of NLP and privacy issues for NLP in Law created if people are creating NLP applications. However, there are concerns on how that application is made then what are the actual issues, and are these concerns still valid when tested.

RQ 1.3. How will a lawyer’s fears affect their attitude to technology?

A lawyer's fears come from privacy issues for NLP in Law, where if there is plenty of literature stating their concerns caused the researcher to assume that there is a perceived fear of this technology.

RQ 1.4. What is the use of similar technology affect a person’s ease of use with this technology?

This question was made from Examples of NLP and NLP in Law that if there are already existing technologies, will participants' opinions change relative to if they have used this technology before.

RQ 1.5. Is the technology beneficial?

As mentioned before, examples found were made without participants. With the lack of lawyers perspective, the researcher of this paper wanted to find out when this technology is used with participants will they see it as beneficial or if traditional work practice is still more practical.

RQ 1.6. How will the accuracy of the application be different depending on what department the lawyer is in?

The accuracy of the application was made when researching Examples of NLP and English Language. If the examples could achieve what they considered an accurate result, will that still be satisfactory. Additionally, the question came from the English language section, where some particular challenges and patterns can cause the literal meaning to be misinterpreted. If you are building an application, you want to be sure that the information you are creating is correct. However, the researcher is not a legal professional, so having this question meant asking legal professionals became important.

RQ 1.7. How will the features of the application change a lawyer's perception of the technology?

This question came from researching 'Examples of NLP'. Suppose there are many examples made for different reasons. Will the desired features the participants want instead of what was found from literature and see if the challenge of the desired features is possible (text summarisation, detecting false information).

5.2 Discussion on Descriptive Analysis

What **Error! Reference source not found.** is about is linking Hypothesis to evidence found in the results in descriptive analysis to determine if the hypothesis made initially in the research is valid or not. This is to link back with the Research Questions and hypotheses can be found in the methodology section. If the researcher believes it is valid they must provide reference to what evidence makes it valid. The survey has the goal to answer the gaps in the literature.

RQ	Hypothesis	Research Evidence (SQ PRE & POST)
RQ. 1.1	H3 - Approved H5 - Approved H7 - Approved H2 - Approved	1. Research participants did not see it as valuable if they could not see them/business using it at its current state. (POST-Q7, POST-Q8) 2. There does not seem to correlate to perceived usefulness and their job title (PRE-Q3, PRE-Q11).

		3. The features requested in the pre-test survey requested varied on the lawyer's area of expertise (PRE-Q3, PRE-Q9, PRE-Q13).
RQ. 1.2	H3 - Approved H5 - Approved H7 - Approved H2 – Approved H1 - Disproved	1. Research participants seemed interested regardless of age. (POST-Q1, POST-Q7) 1. The lawyer's perceived usefulness does not correlate with their comfortability (Pre-Q11, Post-Q12, Post-Q7). 2. The lawyers perceived usefulness may correlate to the features needed but still considered it useful in regards to the features it did have but did want more (Post-Q14, Post-Q7). 3. If the participant sees the application as useful, they are more comfortable with it (Post-Q7, Post-Q11, Post-Q13). 4. How the participant viewed the technology is based on how useful they see the technology changes how comfortable they see the technology (Post-Q7, Post-Q11, Post-Q13).
RQ. 1.3	H3 – Disproved H1 - Disproved	1. The survey results did not indicate that the participants' fear of technology affects their attitude to technology (Post-Q12, Post-Q11). 2. Participants did enjoy using the technology (Post-Q7, Post-Q8) 3. Participants wanted different features, but overall was automated tasks and templates (Pre-Q13, Pre-Q2). 4. The research question is hard to prove when participants generally are not fearful of using technology.
RQ. 1.4	H3 - Approved H6 – Approved H9 - Approved	1. They have not exactly used similar technology other than searching for cases and organising their cases (Pre-Q5, Pre-Q6, Post-Q5, Post-Q6). 2. Participants liked the information the application gave (Post-Q13). 3. The perception of similar technology changed before and after using the technology (Pre-Q5, Post-Q5).

RQ. 1.5	H3 - Approved H5 - Approved H7, Approved H2 - Approved	1. Generally, participants enjoyed using the technology, but they have indicated something missing in the technology from them to be entirely on board using the technology (Post-Q7, Post-Q14). 2. There are also technical issues people experienced which may be an issue (Post Q9).
RQ. 1.6	H3 - Approved H5 – Approved H2 - Approved H4 - Approved	1. People did not indicate issues of the accuracy of the application; because of that, they seemed to enjoy the technology positively (Post-Q13). 2. There are also technical issues people experienced which may be an issue (Post Q9).
RQ. 1.7	H3 - Approved H5 - Approved H7 - Approved H8 - Approved	1. The technology features seem to be what they wanted, and because of that, they could see the advantages to it 2. However, the participants did see it as missing something, and because of that, they did not rate it at the best it could be (Post-Q14).

Table 91 Linking Hypothesis to evidence

5.3 Discussion on Chi-Square results

This section discusses the results of the Chi-square results. With the help of the p-value derived, the relationship between the moderation variables and the independent variables was established as independent or existence. The data of tests were derived from an online survey of 19 participants. The detailed results for each survey question were presented in Chapter 4. From the Chi-square results, we can gather a relationship between the type of practice and their experience getting day to day tasks done and type of practice and level of degree; however, this changes when it comes to post-test as there are fewer participants. There appears to be a relation between age and years of retention/practice and age and their experience learning the technology. In Chi-square, there are not enough participants to find meaning but prove this is not statistically significant and the need for future work to get more participants.

5.4 Discussion on ANOVA results

This section discusses the results of the ANOVA results. With the help of the p-value derived, the relationship between the moderation variables and the independent variables was established as independent or existence. The data of tests were derived from an online survey from 17 participants. The detailed results for each survey question were presented in Chapter 4. The only one considered significant is the age concerning years of retention/practice. Similar to Chi-square, there are not enough participants to find meaning but prove this is not statistically significant and the need for future work to get more participants.

5.5 Summary

In summary, the technology is seen as favourable in the eyes of legal professionals; however, there does seem to be some missing features that need to be added and improve on the technology.

Desired features varied, but the most wanted features are automated tasks and templates when researching cases and document templates. There did not appear to be a fear of the technology, meaning the assumption of participants being fearful of the technology is false. Most favoured the technology but believe there to be something missing. Some technical bugs in the application may have changed the participant's options on the technology.

Opinions on similar technology changed their use between pre-tests where they have not used the technology before and post-test after using the technology. The majority of the respondents who participated in the survey were in the age range of 25-34 and 45-54. The majority belonged to a law firm. Most had a bachelor’s degree. Participants have been in the law practice in the ranges of 6- 10 and 25-34. The technology they primarily used in their day to day work is the Microsoft office suite.

When comparing the results with the hypothesis and research questions, most of it ended up true in regards to the features of the technology and their perception of the technology, however when it came to them being fearful or cornered of this new technology was false, they seemed generally interested in the technology as long as it helped intending to get there day to day tasks completed.

6 Conclusion

In section 6.1, what the researcher believes is the limitations of the research. Section 6.2, the researcher presents a critical analysis of the research process. Section 6.3 the recommendation of future work.

6.1 Limitations

Through an online survey might be the most effective way to gather information in a shorter period. It has its limitations that have been discussed below in brief.

6.1.1 Lack of time

Insufficient time will be one of the biggest concerns for this research project, as this research uses an online survey to gather information. Surveys will be challenging to organise based on when the researcher and participant are available.

6.1.2 Coronavirus

Such coronavirus has come back up can cause an impact on if participants can use the application or if participants can be available to survey. If a participant does become infected, they will most likely be in hospital or bedridden until they are cured. Until the participant is cured, they will be unable to do a participant survey until they have recovered, which causes more time to be needed until they are recovered or time to find other participants. There is also issues about legal fields and even education fields; having to let people go has caused a challenge to have people available to help with this research.

6.1.3 Available Participants

As the participants are practicing lawyers, their availability can change, and schedules will need to be rearranged or the worst-case scenario. They may have to no longer be in the study due to lack of availability.

6.1.4 Limitation to surveys

Surveys have a lack of information on a person's experience and thoughts of the application. A person doing a survey revises their words, and the meaning can change.

Surveys in comparison to interviews can lack some information like in interviews, and the researcher would get to see their body language where they can say one thing and act nervous, indicating there is.

6.1.5 Lack of participants

The researcher believes there are not enough participants to be sure of the conclusions made.

6.1.6 Change in supervisors

I did have two supervisors, but due to COVID-19, the researcher lost a supervisor. The researcher believes that all should be fine, but it means the expertise comes from one supervisor.

6.2 Reflections

The reflections section is what the researcher sees as important and exciting information. This vital information includes what it was like learning NLP, working with lawyers, studying in a time in a pandemic and lessons from the assumption on the participant's views on technologies.

6.2.1 Natural Language Processing

The researcher had never touched NLP, and it was enjoyable to learn how it works and the potential of what it can find. However, the amount of prior knowledge needed to get started is quite large. To get started, you have to know about more advanced math, what models are.

6.2.2 Coronavirus

Coronavirus has caused quite the issue when trying to complete this research as people have been let go in the business, causing it to be challenging to get available participants, which does raise the question of how to conduct researchers during pandemics. Are there alternatives to surveying people employed, or is it best to focus all research efforts on the pandemic?

Not to say this experience wasn’t enjoyable, I did learn slot from both learning NLP, and what it is like working during a pandemic, not many generations of people before me can say they know what it’s like. It’s just during pandemic research that efforts to conduct research become more an effort to work around a pandemic. Even at the time of writing, New Zealand is changing the pandemic level, which raises another question of when is a pandemic over.

What was learnt is that even the initial pandemic hits business closed down and got assistance from the government, then levels go down, and businesses can work again, but not the same, products and services they provided has lessened due to a less availability to people outside of New Zealand, which means business have to make sacrifices, let employees go, find alternative cost-saving changes, let services to for now as they can't currently cover the costs.

6.2.3 Views on Technology

The researcher was wrong about the opinion in participants dismissal of new technology; the participants did not care how the feature is made; what they care about is if it meets their needs. My solution seems to need more work to be considered good enough. My solution

6.2.4 Give the participants an end date

During the Pre-test phase, it took nearly a whole month for all participants to finish, while for the post-test with an end date a week from now, people finished within the week. When doing research, what was learnt is giving a time frame for participants because they will delay from doing it.

6.2.5 Contacting Participants

When conducting research, the way you will contact people will constantly change. Revision is constantly made, and some revisions will be more successful than the last. For readers curious, the Second Version was more successful. This version is primarily due to more focus on being sincere and detailing in the email their busyness.

6.2.6 Legal English

In the view of Legal English in using understanding it with NLP, it can be done, but it did require extending the logic from English as there are different rules.

6.2.7 Time to complete

The time to complete the post-test rose dramatically, most likely due to having an application to use. Most likely, the participant opened the survey and application at the same time and came back to the survey once they finished using the application.

6.3 Future Work

Move away from surveys as surveys participants do not have the social need to explain themselves more. Find out those missing features, but that becomes finding features needed

that the participants do not know they need. Move into seeing the feature of recommending similar cases to cases added to the application; the metadata was there to allow it (Appendix: **Error! Reference source not found.**). Still, internal testing the recommendations ended up being the same company/person but different legal act they were going against or different people, same act but for different actions that lead to going against the legal act. In this survey, 19 responses were collected, so the number of responses did not reach a statistically significant number so for future work it would be good to get more participants.

6.4 Concluding Remarks

Implementing an application in the legal field is a lot of work, and there are many different needs relative to the person requesting the feature. There are everyday needs like Templates and automation. Overall, it is a good learning experience, and there is still more needing to expand on for it to be considered business ready.

The literature helped understand what NLP and machine learning is for the researcher, like models being essentially an expert knowledge to achieve results, learning iteration of models being made and this iteration causing models to become more accurate and requiring less hardware strain as each new model is made. Seeing examples of how NLP was used currently and theorised in legal fields helped scope what could and could not be done. Learning the issues of Legal English differences helped identify types of issues that may arise when trying to get a machine to understand the English language. The philosophical worldview for this research is post-positivism, and a quantitative approach is used. The theoretical framework for this research is a modified TAM model. For sampling, a population size of 68 was considered. In this survey, 19 responses were collected. The number of responses did not reach a statistically significant number.

From the results of descriptive analysis, the researcher can conclude that the Desired features varied, but the majority wanted automation when researching cases and templates for documentation and researching cases. There did not appear to be a fear of the technology, meaning the assumption of participants being fearful of the technology is false. Most favoured the technology but believe there to be something missing. Some technical bugs in the application may have changed the participant's options on the technology.

However, this research has some limitations, mostly around getting participants to participate and the research during COVID-19. In future, more work could be done to obtain broader and

more accurate results, including getting more participants and expanding on features of the application like recommending research material to automate the task of finding similar cases.

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APPENDICES

A. List of Acronyms

A

AI - Artificial Intelligence

N

NLP – Natural Language Processing

NZ – New Zealand

B. Computer specifications

The reason for specs is that the research being a part of NLP and NLP can be a resource strain to clarify any issues details on why those NLP models are primarily due to the hardware used.

Category	Installed component
CPU	6700
Disk	SSD
GPU	960 GTX
RAM	16 GB

Table 92 PC specs

C. Code

```
pdfs = pdf.process()

for pdfitem in pdfs:
    processed = process.process(pdfitem)

    connection.connection(processed)
```

```
## GET PDF FILES
fn readfiles():
    os.chdir(".")
    pdfs = []
    for file in glob.glob("*.pdf"):
```

```
        pdfs.append(file)
    return pdfs
```

Figure 64 Scan through a list of documents

```
fn process():
    ## INIT
    getpdfs = readfiles()
    data_pdfs = []

    ## PDF Loop
    for pdf in getpdfs:
        data_pdf = { }
        pdf = pdfplumber.open(pdf)
        text = []

        #metadata = page.metadata
        if pdf.metadata:
            data_pdf["metadata"] = pdf.metadata

        pages = pdf.pages
        for page in pages:
            value = page.extract_text()
            if value:
                text.append(value)

        data_pdf["text"] = text
        data_pdfs.append(data_pdf)

    return data_pdfs
```

Figure 65 Iterate through document

```
fn connection(processed: List):
    config = {
    'user': 'PHPUSERNAME',
    'password': ''PHPPASSWORD',
    'host': 'IP ADDRESS',
    'database': 'DATABASENAME'
    }

    Database = database.connect(config)

    insert = ("INSERT INTO decisions "
              "(summary_text, metadata, text, ner) "
              "VALUES (%(summarizer)s, %(metadata)s, %(text)s, %(ner)s)")
```

```
# Insert salary information
data = {
'summarizer': json.dumps(processed["summarizer"]),
'metadata': json.dumps(processed["metadata"]),
'text': json.dumps(processed["text"]),
'ner': json.dumps(processed["ner"]),
}
cursor.execute(insert, data)


# Make sure data is committed to the database
Database.commit()
```

Figure 66 Send to database

D. Application Images

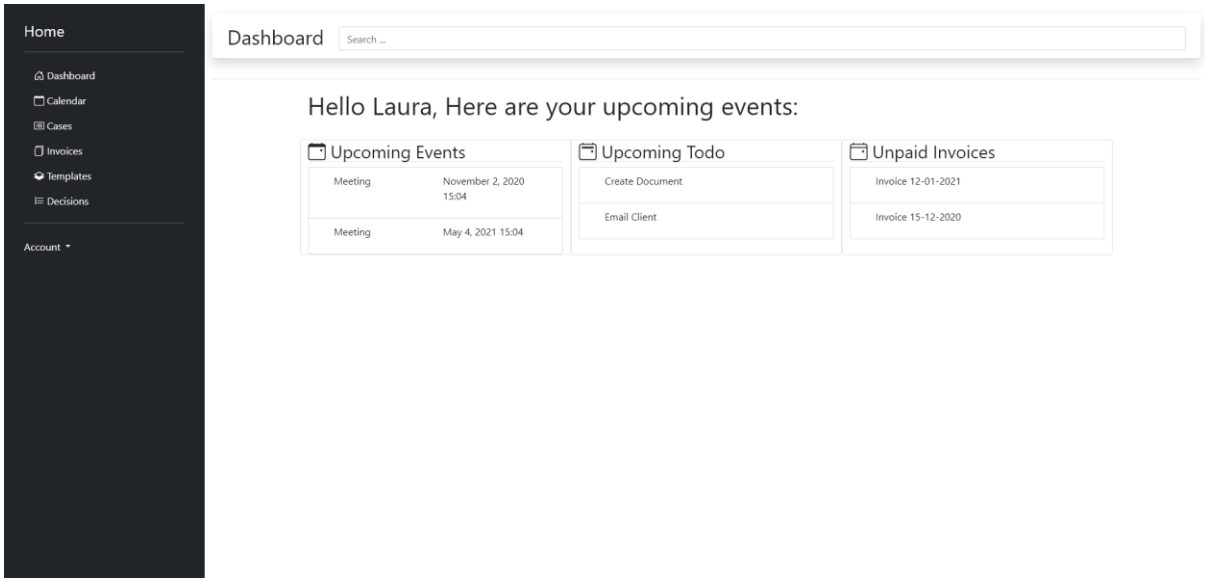


Figure 67 Dashboard

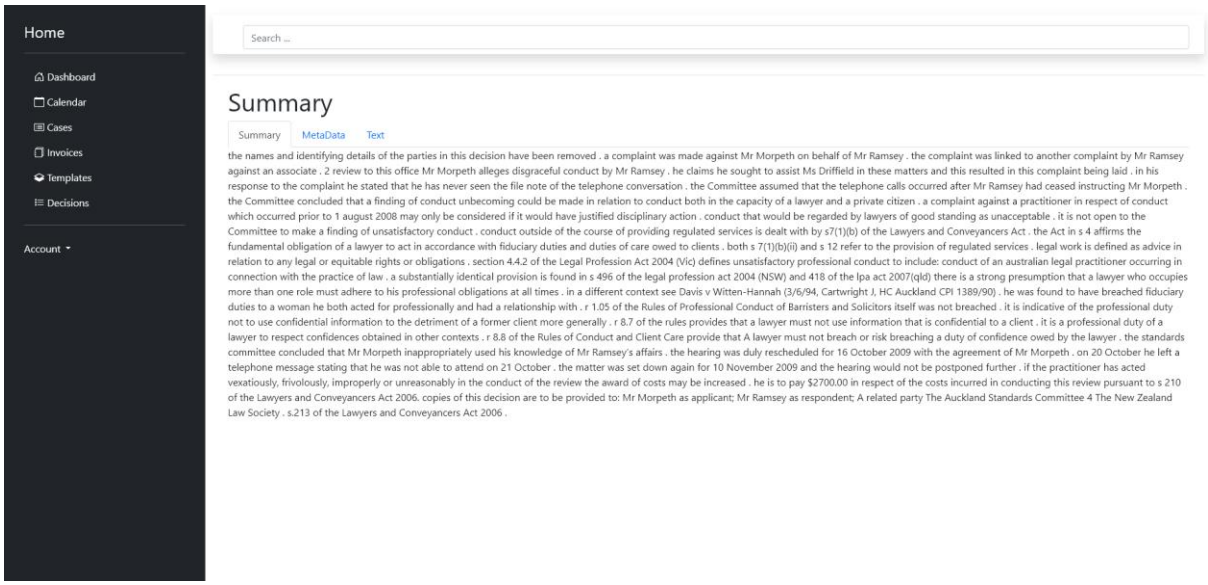


Figure 68 Summary

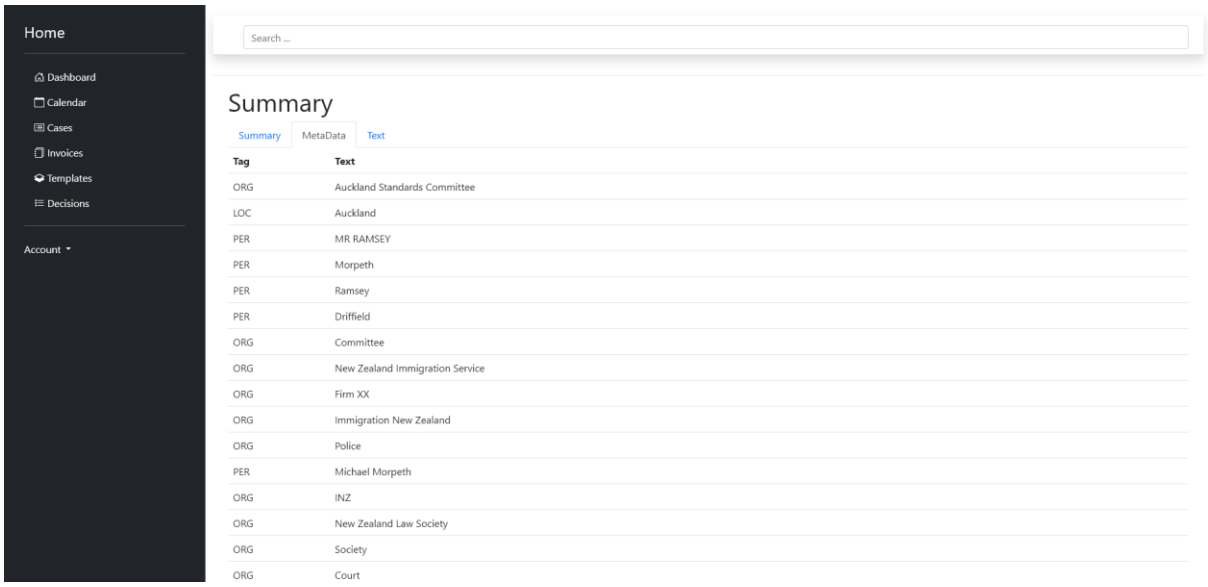


Figure 69 Metadata Gathered

E. Survey Questions

a. Pre-test

Q1 What is your Age?

- 0-17 (1)
- 18-24 (2)
- 25-34 (3)
- 35-44 (4)
- d. 45-54 (5)
- e. 55-64 (6)
- f. 65-74 (7)
- g. 75+ (8)

Skip To: End of Survey If What is your Age? = 0-17

Q2 Type of practice

- a. Law firm employee (1)
- b. Law firm partner (2)
- c. Sole practitioner (3)
- d. Sole Barrister (4)
- e. In house lawyer (5)
- Other (6)

Skip To: Q3 If Type of practice != Other

Q2.5 What is the other?

_____

Q3 Level of Degree?

- Bachelor (1)
- Post Grad (2)
- Law honours (3)
- Other (4)

Skip To: Q4 If Level of Degree? != Other

Q3.5 What is the other?

_____

Q4 Years of Retention/Practice?

- 0 (1)
- 1-5 (2)
- 6-10 (3)
- 11-15 (4)
- 16-24 (5)
- 25-34 (6)
- 35-44 (7)
- 45+ (8)

End of Block: About You

Start of Block: Research

Q5 Have you used technologies to assist you with your work before?

- Yes (1)
- No (2)

Skip To: Q7 If Have you used technologies to assist you with your work before? = No

Skip To: Q6 If Have you used technologies to assist you with your work before? = Yes

Q6 Why did you like it?

_____

Q7 How did it feel getting day to day work done?

- Excellent (1)
- Good (2)
- Bad (3)
- Terrible (4)

Q8 What do you think of the process of getting day to day work done?

Ideas you can talk about: The process of getting a task done. The process of reviewing information created The process of using a feature Did you like using it, did you not?

_____

Q9 What are the issues are you facing currently?

Examples: To slow Wrong information

_____

Q10 What was your experience getting day to day tasks done?

- Excellent (1)
- Good (2)
- Bad (3)
- Terrible (4)

Q11 What do you think of using a machine providing you with information?

- Excellent (1)
- Good (2)
- Bad (3)
- Terrible (4)

Q12 How did you feel about the information you find on your own?

- Excellent (1)
- Good (2)
- Bad (3)
- Terrible (4)

Q13 What do you think should be added to the application?

Examples: Automating tasks More Insights Templates Helping with a problem you have

---

b. Post Test

Q1 What is your Age?

- 0-17 (1)
- 18-24 (2)
- 25-34 (3)
- 35-44 (4)
- d. 45-54 (5)
- e. 55-64 (6)
- f. 65-74 (7)
- g. 75+ (8)

Skip To: End of Survey If What is your Age? = 0-17

Q2 Type of practice

- a. Law firm employee (1)
- b. Law firm partner (2)
- c. Sole practitioner (3)
- d. Sole Barrister (4)
- e. In house lawyer (5)

Q3 Level of Degree?

- Bachelor (1)
- Post Grad (2)
- Law honours (3)
- Other (4)

Q4 Years of Retention/Practice?

- ○ 0 (1)
- ○ 1-5 (2)
- ○ 6-10 (3)
- ○ 11-15 (4)
- ○ 16-24 (5)
- ○ 25-34 (6)
- ○ 35-44 (7)
- ○ 45+ (8)

End of Block: About You

Start of Block: Research

Q5 Have you used other similar technologies before?

- ○ Yes (1)
- ○ No (2)

Skip To: Q7 If Have you used other similar technologies before? = No
Skip To: Q6 If Have you used other similar technologies before? = Yes

Q6 What was that application and why you liked it?

_____

Q7 How did it feel to use this technology?

- Excellent (1)
- Good (2)
- Bad (3)
- Terrible (4)

Q8 What do you think of the process of using the technology?

Ideas you can talk about: The process of getting a task done. The process of reviewing information created The process of using a feature Did you like using it, did you not?

_____

Q9 Did you have any issues using the technology?

Examples: Inaccuracies Missing information

- ○ a. Yes (1)
- ○ b. No (2)

Skip To: Q11 If Did you have any issues using the technology?Examples:Inaccuracies Missing information = b. No

Skip To: Q10 If Did you have any issues using the technology?Examples:Inaccuracies Missing information = a. Yes

Q10 What are the issues you have had using the technology?

Examples: To slow Wrong information Graphical glitches

_____

Q11 What was your experience like learning this technology?

- ○ Excellent (1)
- ○ Good (2)
- ○ Bad (3)
- ○ Terrible (4)

Q12 What do you think of using a machine providing you with information?

- ○ Excellent (1)
- ○ Good (2)
- ○ Bad (3)
- ○ Terrible (4)

Q13 How did you feel the information the application gave?

- ○ Excellent (1)
- ○ Good (2)
- ○ Bad (3)
- ○ Terrible (4)

Q14 What do you think should be added to the application?

Examples: More Insights Templates Helping with a problem you have

_____

F. Low-Risk Human Ethics in Research Application Form

The RPGO is located at the City Campus, D-Block (Offices D2.22 – D2.24), email research@wintec.ac.nz or phone Megan Allardice on Ext. 3582 for more information.

Please see the last page of this document for detailed instructions for completing this form.

1.0 PROJECT TITLE
Factors affecting the uptake of Natural language processing within the New Zealand Law System

2.0 RESEARCHER(S)		
2.1	Primary researcher's name	Alex Thomas
2.2	School//Centre/Unit	Wintec
2.3	Contact Details (Telephone and Email)	0220376132
2.4	Is this application a:	☑ Student Application ☐ Staff Application
2.5	If this is a student application, please provide the Module code here	INFO902/2002
2.6	Is this project a staff application that utilises work partially or wholly undertaken by students who are not participants (e.g. data collection undertaken by a researcher's class)?	No

2.7	If so, please clearly describe what the role of these students is to be in this research, what the work will be used for explicitly (including any issues regarding authorship of research outputs such as journal articles), and what steps have been taken to ensure students are aware of this.	Not applicable
2.8	Name of other Researcher(s) and positions. (If this is a student application, please provide the name(s) of the project supervisor(s) and indicate that they are supervisors here.)	Dr Kay Fielden
2.9	Contact Details of other researchers and supervisors (Telephone and Email)	Email: Kay.Fielden@wintec.ac.nz
2.10	Is this application:	☑ A new application ☐ A subsequent approval request following a significant change to an already approved application

3.0 PROJECT TIMELINE

The projected start date for **data collection** (once this ethics application is approved. Please note, projects can only begin once applications have been approved, regardless of the level of risk):

Projected end date: March 2021

4.0 PROJECT SUMMARY (please include your research purpose and objectives, the methodology will be dealt with in Section 6)

The purpose of pre-test and post-test is to allow for physical experiments and gather input from people. The process is gathering information before the person uses the feature and then collect feedback again after them experiencing using the NLP application.

This study aims to find the factors in law case studies as they are widely accessible at this time and create a Natural language processing application. The reason for this research is: the increase in cases, increase in lawyers, and matters are getting carried over to the next year. The NLP application goal is assisting lawyers in their work while also ensuring that the application is not replacing workers. The process will be comparing the process they did to achieve their day to day tasks and compare it with their experience with using the NLP application to perform their day to day tasks effectively.

5.0 PROJECT METHODOLOGY (including methods for data collection)

The data for this research will be gathered using online surveys. Online surveys will occur preferably on Qualtrics unless the participant is more comfortable using their communication tool.

6.0 CONSIDERATION OF ETHICAL ISSUES AND PROCESSES

Applications Completed:

- Screening questionnaire
- Low-Risk application
- Participants Consent Form
- Participants Information Sheet

Risk of harm

This research is building an NLP application, gathering information from participants through an anonymous survey and a literature review. The study will not use general questions so to avoid the survey causing discomfort or disadvantage for the participants. The researcher does not believe that the survey questions will not put the participant in any discomfort as the questions are not personal to them; just questions on their thoughts on the NLP application. The questions are not made to risk a participants employment if they did say anything wrong about a business, privacy and confidentiality section will help explain what process is in place to protect them.

Informed and voluntary consent

The person taking the survey must agree to the Participant Consent Form at the top of the survey to ensure they do understand what it means to be doing the survey. Insights are not gathered on incomplete survey results; this is an assumption by the researcher that a complete survey response, are responses the participants are satisfied with. There as an option for them to have a copy of their answers if they so wish. There is an option for the person who did previously consent to change their mind that means the researcher will remove them from the research, including insights. How the researcher will get participants is through emailing them (An email example can be found near the bottom of the document, Recruitment email/letter) and the researcher is going to the business/person face to face and asking if they wish to. The purpose of having the first question “SQ 1. What is your age?” and the first option being “< 18” is to make sure all participants are 18 and above. If a participant chose the option, the participant would be taken to the end of the survey saying thank you for being apart of the survey because the researcher can not have anyone under 18 answering the survey questions.

Privacy and confidentiality

The person will not be identified individually. Data gathered will be of a summarised for group of people; for example, 65% of Sole practitioners desire the technology. Not being identifiable protects the participant, to ensure that their employment is not at risk. An example of why it is like this is using the survey question “SQ 10. What was your experience learning the application throughout the

study?". SQ10 is an open-ended question, and the participant could say a thing bad about the business, my survey cannot identify if they currently work at the business, nor any personal information like there name, address business title.

There is also the potential in an open-ended question that a participant can identify people with their response, e.g. "I hate Dave Robinson, our CIO for reasons like this. I have asked him multiple times to explore different technologies but does not". The previously mentioned response would get summarised into "The participant is unhappy with how technology is being explored in their business" for three reasons. First reason, It identifies someone "Dave Robinson", and that defeats the purpose of an anonymous survey. Second, Not all business has a CIO so that scenario would only apply for them, which makes it difficult to find themes. The third is, "…I have asked him multiple times.." would make it easier to determine who the person was, who wrote this response and this can be a danger for the participant's employment if the employer requests a copy of what their employees have said in the researcher's survey.

Deception

The research is being presented as to observe the participants using the NLP application and determine if an NLP application in Law would be beneficial for lawyers. The researcher believes this is not considered as deception of participants, including concealment and covert observations.

Conflict of interest

The researcher is not funded, and the researcher would not gain or lose funding doing this research. The researcher is a student in ICT and is not a part of any legal firm. However, the researcher is the person developing the solution and desires for the technology to be successful.

Compensation to participants

The researcher will make sure that no payments or inducements are given to participants. The only gain/incentive to be a participant is, by the end of the research, they will have the opportunity to acquire the NLP application for their business.

Treaty of Waitangi and Māori participation, Other cultural considerations and Health and disability

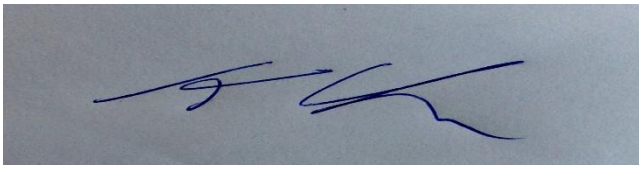
Māori or the cultural differences or a lawyer with disabilities is not the focus of this project. Even though lawyers can be Māori or other cultures and will be including them in the study, the researcher is not focusing on their experience as a Māori lawyer. The researcher would also not be focusing on the possible struggles of a lawyer with disabilities. The focus is on a lawyer's experience using the NLP application regardless of race, disabilities or beliefs. The research is also using an anonymous online survey; The researcher could not identify the participant's race or beliefs, which should ensure all participants are treated fairly.

Researcher(s) signature(s) (the name and signature of all researcher(s) are to be included):

Name	Signature	Date
Alex Thomas		18/08/2020

Primary Supervisor's signature (if this is a student application):

Name	Signature	Date
Dr Kay Fielden		18/08/2020



Research Leader's signature:		
Name	Signature	Date

HERG Chairperson or delegated representative's signature (RPGO use only):		
Name	Signature	Date

HUMAN ETHICS IN RESEARCH LOW RISK APPLICATION FORM - CHECKLIST
Research project title: Factors affecting the uptake of Natural language processing within the New Zealand Law System
Name of primary researcher:

Alex Thomas

Attached please find (as applicable) in the order listed below		
Completed HERG Low-Risk Application Form	☑ Yes	☐ No
Consent Form for participants	☑ Yes	☐ No
Information Sheet for participants	☑ Yes	☐ No
Copy of Focus Group Questions, Survey Schedule, or similar	☑ Yes	☐ No

G. Participant Consent Form

Participant Consent Form

Factors affecting the uptake of Natural language processing within the New Zealand Law System

Participant Consent Form

(one copy will be retained by the Research Participant and one copy to be retained by the researcher)

I…… (participant's name) consent to be a participant in the research mentioned earlier, and I attest to the following:

1. I have been informed thoroughly of the purpose and aims of this project
2. I understand the nature of my participation
3. I understand the benefits that may be derived from this project
4. I understand that I may review my contributions at any time without penalty
5. I understand that I will be treated respectfully, fairly and honestly by the researcher/s, and I agree to treat the other participants in the same way
6. I understand that I will be offered the opportunity to debrief during or after this project
7. I have been informed of any potentially harmful consequences to me of taking part in this project
8. I understand that I may withdraw from the project at any time (without any penalties)
9. I understand that my anonymity and privacy are guaranteed, except where I consent to waive them
10. I understand that information gathered from me will be treated confidentially, except where I consent to waive confidentiality
11. I agree to maintain the anonymity and privacy of other participants and the confidentiality of the information they contribute.

Participant……Date……

Principal

Researcher……..Date…….

H. Participant Information Sheet

Participant Information Sheet

Project Title: **Factors affecting the uptake of Natural language processing within the New Zealand Law System**

Type: Survey

Institution: Wintec, Hamilton City Campus

Researcher: Alex Thomas

Purpose

This study aims to find the factors in law case studies as they are widely accessible at this time and create a Natural language processing application. The process will be comparing the process they did to achieve their day to day tasks and compare it with their experience with using the NLP application to achieve their day to day tasks effectively.

Expectations of participants

You have the required knowledge and experience in the law system that may prove to be significant for this research.

Duration

10 - 15 Minutes

Collection of information

- Information you provide will be on Google servers.
- Notes of the survey will be stored on a notepad

What will happen to the information provided

- Surveys will stay on Google servers until the study is over
- The electronic copy will be stored on the researcher's password-protected computer

Participation

Participation in this survey is voluntary. It is up to you to decide whether you wish to participate. However, if you want to go ahead, you can keep a copy of this information sheet. You are free to withdraw your participation at any point of time without providing any reason though email or mobile.

Will your participation be kept confidential?

All the information collected from you during the research will be kept confidential. You will not be identified in any form. The results of this research will be made available to the participants only on request.

Will your participation be acknowledged?

Every participant's information will be kept confidential. If the participant wishes to be personally acknowledged, they may request it. Due to confidentiality, the research will assume that they want to to be kept anonymous.

Where will the research results be made available?

The results of this research will be published in the research report. Your information will be kept confidential at all times. However, if you wish to receive a copy of this report, kindly send an email to the researcher.

Name of Researcher/s: Alex Thomas

Contact Details:

Email: alethoa6@student.wintec.ac.nz

Mobile: 0220376132

Date: 08/06/2020

I. Recruitment email/letter

a. First Version

Dear [Person]

This letter is to introduce myself and request you kindly participate in a survey associated with my current studies.

My name is Alex Thomas. I am a student at Waikato Institute of Technology, completing my Masters in IT.

I am studying an NLP (Natural Language Processing) application. This study will assess the meaning/s in text and methods of categorising documents. The intention is to try and assist lawyers/legal personnel with their cases in multiple areas, e.g. property, immigration, trusts etc.

My request for you is to review two (2) online surveys.

1. The first survey is a preliminary survey to establish the area of expertise of the participant and to assist me in understanding what their needs are.
2. The second survey is for the participant who would have used the application and identified if it meets their expectations and assists them.

Each survey will take only 10-15 minutes to complete.

The aim is to establish a National Language Processing format to assist in locating factors in law case studies. These documents are widely accessible to legal people. The NLP application will provide users with categories to enable them to achieve information more efficiently than currently in their day to day tasks. It has been identified for many years, an increase in cases and the overall workload in the "legal world"! The NLP application goal is to assist the legal profession in their work while also ensuring the application is not replacing staff.

Regards

Alex Thomas

Recruitment email

a. Second Version

Dear,

This email introduces myself and request you to please participate in a survey associated with my current research.

My name is Alex Thomas. I am currently a student at Waikato Institute of Technology, completing my Masters in Information Technology.

I am studying an NLP (Natural Language Processing) application. This study will assess the meaning/s in text and methods of categorising legal documents. The information gathered from these surveys aims to establish a National Language Processing format to assist in locating factors in law case studies. The NLP application will allow users to analyse and store information, streamlining day to day tasks. The outcome of this research is to assist Lawyers/Barristers or other legal personnel with their cases in multiple areas, e.g. conveyancing, immigration, trusts, wills, litigation etc.
The NLP application goal is to assist the legal profession in their work while also ensuring the application is not replacing staff.

My request for you is to participate in two online surveys.

1. The first survey is a preliminary survey to establish the participant's expertise and understand their needs.
2. The second survey is for the participant who would have used the application and identified if it meets their expectations and assists them.

Each survey will take you only 10-15 minutes to complete.

If you or someone in your organisation can participate, please reply to this email, and I will send you the links to the surveys!

Thank you sincerely for your time, and if you have any further queries regarding this email, please contact me.

I wish to thank you sincerely for your time.

Sincerely
Alex Thomas

b. Email for Post Test

Hey [Persons name],

Here is the final part of the research. I do have a request to finish this survey can you have it done by Wednesday. I expect to exploring the website will take 10-15 mins and 10 mins to do the survey.

If you have any issues I do not mind you emailing your problem.

Link to site

[Online link to access site]

Login Details

There are multiple accounts if you want to try the application with multiple people.

The names do not match up with yours to keep anomality

[Block of accounts]

Link to survey

[Survey Link]

Sincerely

Alex Thomas